

An analysis of the food security of the  
Rama indigenous group, Nicaragua

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## Declaration

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I, Andrew Papworth, confirm that the work presented in this thesis is my own.

Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Andrew Papworth



## Abstract

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Food insecurity affects two billion people worldwide, but food security scholarship and policy has tended to be too focused on the amount of available food, rather than whether populations are able to access and use the available food consistently. Studies have also typically focused on the global or national scale, meaning local issues are sometimes ignored. There is also no consensus on how food security should be measured.

This thesis investigates the food security of the Rama indigenous group of Nicaragua who are located in the Caribbean Coast region of Nicaragua. It provides a fine-grained understanding of the determinants of their food security and what affects their vulnerability. It uses an adaptation of an Emergency Food Security Assessment (EFSA) tool called the Household Economy Analysis (HEA) and assesses its usefulness for conducting research of this type. A total of 110 household surveys and 41 semi-structured interviews, along with dietary surveys with nine families, were conducted across three Rama communities.

The thesis makes three major insights. Firstly, it shows there is considerable heterogeneity within the Rama community meaning there are differences in household-level vulnerability to threats. This heterogeneity is partly determined by the geographies of access that households have to natural resources, markets and jobs, as well as differences in cultural values and endowments. Secondly, the thesis shows it is likely that global food insecurity is being underestimated because current measures of food security tend not to capture the nuances of household-level food insecurity. Thirdly, the thesis shows the need for a systems-based approach to food security. Current resilience theory has difficulties taking into account heterogeneity at the household level, meaning important socio-economic and/or environmental factors that can cause household-level inequality are missed. A more holistic, geographically-specific understanding of food security could provide a fruitful approach to trial new conceptions of resilience theory.



## Impact Statement

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This thesis made three major insights and these can be put to beneficial use in a number of ways. The first finding was the heterogeneity within the Rama community in terms of their food security. This knowledge can be used in the improvement of food security measurement, which will also be enhanced by further developing the adaptation of the Household Economy Analysis used by this thesis.

The thesis argues that the heterogeneity noted is partly determined by the geographies of access that Rama households have to natural resources, markets and jobs, as well as differences in cultural values and endowments. Policymakers and other stakeholders will benefit from considering these questions of access when designing new initiatives.

The second major insight of this thesis was that global food insecurity is probably being underestimated. The knowledge that food insecurity could be more extensive than presently thought could help to ensure its global prominence within development narratives, particularly in relation to the achievement of the UN's Sustainable Development Goals.

Thirdly, the thesis highlights how food security is constructed by multiple factors, including the environment (notably climate change), public health, and access to land and employment. This suggests that because of its complexity, food security can only ever be fully understood at the local level. This knowledge will be of benefit for the development of new frames of reference. Concepts such as food resilience and food sovereignty might prove useful in this respect. This insight will also benefit policymakers and NGOs in terms of how they respond to food insecurity. It reinforces the view that the best way to improve food security is unlikely to be short-term food aid; instead, a system-based approach to the problem is needed.

In terms of the further theoretical impact of the thesis, it was shown that the Rama households' perception of risk and cultural differences, as well as decisions about, and constraints upon livelihood strategies, affected their vulnerability and resilience. This suggests that food security measurement should aim to include household perception and/or experience of food insecurity indicators.

Finally, there is a paucity of research into the Rama and this thesis will raise awareness about the community and the issues they face.

The impact of this research has been, and will be disseminated in a number of ways. Firstly, a post-data collection meeting was held to share the preliminary results with the Rama community. Secondly, a short summary of the project's findings will be shared with local stakeholders and community members, which will give them the opportunity to discuss the findings and find appropriate solutions or strategies for the issues raised. Finally, the results have been presented at conference presentations and will be published in peer-reviewed publications. This will help to bring the findings of this research to a wider academic audience.



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## List of Abbreviations

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BICU	Bluefields Indian and Caribbean University
EFSA	Emergency Food Security Assessment
FAD	Food Availability Decline
FAO	Food and Agricultural Organisation (of the United Nations)
FED	Food Entitlement Decline
FIES	Food Insecurity Experience Scale
FSLN	Sandinista National Liberation Front (Abbreviation in Spanish)
GDP	Gross Domestic Product
GTIs	Indigenous Territorial Governments (Abbreviation in Spanish)
GTR-K	Rama-Creole Territorial Government (Abbreviation in Spanish)
HEA	Household Economy Analysis
NGO	Non-Governmental Organisation
RACCN	Northern Autonomous Region of the Caribbean Coast (Abbreviation in Spanish)
RACCS	Southern Autonomous Region of the Caribbean Coast (Abbreviation in Spanish)
SES	Socio-ecological System
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
UNO	United Nicaraguan Opposition
URACCAN	University of the Autonomous Regions of the Nicaraguan Caribbean Coast (Abbreviation in Spanish)
WFP	World Food Program (of the United Nations)



# 1. Introduction

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Food insecurity affects at least two billion people worldwide (Wheeler and von Braun, 2013). It is estimated that there are 815 million undernourished people in the world (FAO, IFAD, UNICEF, WFP, 2017) and the World Food Programme (WFP) had to assist 82.2 million people with food or cash in 2016 (Beasley, 2016). At the same time, overweight and obesity have increased in almost every region in recent years (FAO, IFAD, UNICEF, WFP, 2017).

Food insecurity has significant implications. Black *et al.* (2013) estimate that undernutrition is a cause of 3.1 million child deaths annually. Wasting or growth stunting, both of which are food insecurity-induced conditions, can reduce immunity and cause irreversible damage to both the physical and cognitive abilities of children (Jyoti *et al.*, 2005; Black *et al.*, 2013). Malnutrition is also a significant contributor towards poorer population health (FAO, IFAD, UNICEF, WFP, 2017), increased poverty and inequality (Hamelin, Habicht and Beaudry, 1999; Olson, 1999), conflict (Châtel, 2014; Gleick, 2014) and migration (Rademacher-schulz, Schraven and Mahama, 2014; Warner and Afifi, 2014).

The most recent research suggests that the number of chronically undernourished people globally increased between 2015 and 2016, although the current number is fewer than in 2000 (FAO, IFAD, UNICEF, WFP, 2017). There are a number of potential threats to food security that could contribute towards continuing this increase and erode previous progress, including climate change (Schmidhuber and Tubiello, 2007; Costello *et al.*, 2009; Challinor *et al.*, 2014; Milliken *et al.*, 2017), water insecurity (Hanjra and Qureshi, 2010; Taylor, 2013), socio-economic challenges such as changing tastes and global market shifts, land grabs and changes in population size (Popkin, Lu and Zhai, 2002; Loring and Gerlach, 2009; Godfray *et al.*, 2010; Nally, 2015), peak phosphorus (Cordell, Drangert and White, 2009), peak oil (Neff *et al.*, 2011), and biodiversity loss (Phalan *et al.*, 2011; Tscharrntke *et al.*, 2012). These factors are not discrete, often interacting with one another to cause food insecurity in a specific location (Châtel, 2014; Gleick, 2014).

Within the countries of the Global South, certain populations are more at risk of food insecurity than others. These include people who live in rural locations (FAO, IFAD & WFP 2015), those who rely more on natural resources<sup>1</sup>, which are highly sensitive to change (Adger, 2000), and children, women and older people (McIntosh and Zey, 2010; Black *et al.* 2013).

This thesis is focused on food insecurity within small communities. It explores this by using an adaptation of a methodological framework designed to assess vulnerability to famine. The contribution of the thesis is outlined in Section 1.1 (below), which also briefly defines food security and highlights the current gaps in the literature.

This chapter is structured into five sections. The first section will briefly define food security and highlight the gaps in this literature. A more detailed food security definition and important related concepts will be discussed in the literature review (chapter two). The second section of the chapter will detail the case study used for the project, including a description of the study population and the three communities where the fieldwork was conducted. The third section of the chapter will briefly describe the methodological framework adapted for this thesis (which is outlined in more detail in chapter three). The fourth section of the chapter consists of the project aims and objectives. The fifth section will outline how the thesis is structured.

### **1.1: The contribution of the thesis**

Food security can be defined as “a situation that exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, IFAD, UNICEF, WFP and WHO. 2017: 107).

This definition encapsulates the fact that food security has four dimensions: availability, access, utilisation and stability (Gregory, Ingram and Brklacich, 2005; FAO, 2006). The availability dimension of food security relates to the amount of food there is and whether there is enough to meet demand (Schmidhuber and Tubiello, 2007; Burchi and

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<sup>1</sup> It is important to note, however, that there are differences between rural and urban areas. The urban poor are more likely to be affected by price fluctuations than those who live in rural locations and rely largely on natural resources (Young 1987; Rodriguez-Takeuchi and Imai 2013).



Muro, 2016; Carletto, Zezza and Banerjee, 2013). It is determined by both animal and crop yields, the functioning of markets and the requirements of the population. The access dimension of food security refers to whether certain populations and individuals are able to acquire the available food—the demand side of food security (Drèze and Sen, 1991; Barrett, 2010). This may be determined by food prices, and legal and political factors. The utilisation dimension of food security refers to whether individuals are able to consume the food that is available and to which they have access, and includes dietary quality, food safety and people’s food preferences (Pinstrup-Andersen, 2009; Barrett, 2010; Hendriks, 2015). For example, an individual may not be able to eat the food that is available and accessible for them because it is not safe to eat, they are unwell, or it is culturally inappropriate for them. The stability dimension of food security encapsulates the other dimensions, but refers to whether certain populations and individuals are always able to access adequate food (Carletto, Zezza and Banerjee, 2013). It differentiates between chronic (continuous) food insecurity and transitory food insecurity, which may be caused by seasonal changes or other crises that affect food availability, access or utilisation for a specific period. This is the most common form of food insecurity (Carletto, Zezza and Banerjee, 2013).

There are four areas where more research is needed. Firstly, most food security research tends to focus on the availability dimension of food security. For example, 70 percent of all climate change and food security research has focused on food availability (Wheeler and von Braun, 2013). More research is therefore needed into the access, utilisation and stability dimensions of food security. Secondly, studies on food security typically focus on the global or national scale (Bini, 2018). This means that inequalities within countries are often ignored so that the way in which potential drivers of food security and mediating factors interact at the local level is missed (Gleick 2014; FAO, IFAD, UNICEF, WFP & WHO, 2017; Bini 2018). Recent reports have emphasised that more research is needed to collect “detailed information at the household – or even better, individual – level” (FAO, IFAD, UNICEF, WFP & WHO, 2017: 24), in order to avoid having an understanding of food security that is based on its relationship to just one risk factor (Hulme, 2011; Papworth, Maslin and Randalls, 2015). Reductionist research can mean effective policy options are closed off and social inequality is increased (Lang and Barling, 2012; Zeitoun *et al.*, 2016; Bini 2018). Thirdly, there is no consensus on the way in which food security should be measured, with no ‘gold standard’ food security indicators or assessment methodology agreed upon (Carletto *et al.*, 2013). More

research that assesses food security measures and methodological frameworks is therefore needed. Finally, there has been little research done into how the academic concepts of vulnerability and resilience play out on the ground in relation to food security, suggesting a greater theoretical engagement with resilience at the household level is needed (Tendall *et al.*, 2015; Wilson, 2018). This is particularly noticeable in relation to the stratification of food security resilience within small communities.

This thesis contributes towards plugging these gaps by investigating the food security of the Rama indigenous group that lives on the Caribbean Coast of Nicaragua. The thesis provides a fine-grained analysis of the community by using an adaptation of a methodological framework that is able to capture the availability, access, utilisation and stability dimensions of food security at the local scale, as well revealing how multiple factors (including resilience) contribute towards vulnerability to food insecurity. In doing so, the thesis will assess the methodological framework’s suitability to measure food security in this and other settings.

Table 1.1: Gaps in the food security literature and how this thesis aims to address them

<b>Gap</b>	<b>Description</b>	<b>How this thesis will address these gaps</b>
1	The paucity of literature on the access and utilisation dimensions of food security	Through focusing on understanding these dimensions using a case study of the Rama indigenous group
2	A better understanding of how potential drivers and mediating factors interact to determine food security in small communities	Through using mixed methods to determine the drivers and mediating factors that influence the Rama’s food security
3	The lack of a ‘gold standard’ measurement of food security	Through using an adaptation of a Emergency Food Security Assessment framework and evaluating its effectiveness
4	A greater theoretical engagement with food security resilience at the household level is needed	Through collecting data that focuses on the stratification of food security vulnerability and resilience at the household level in the Rama communities

Source: Author

The following section of this chapter (Section 1.2, below) details the case study. It will first describe why Nicaragua was chosen as the case study, outline key information and

statistics about the country, and briefly describe its history. It will then describe the food security challenges the country faces. It will then outline how the Rama were chosen as the study population before detailing their history and the three communities where data were collected.

## **1.2: The case study**

The Rama indigenous group face multiple threats to their food security, so they are an appropriate population for this thesis to investigate. Nicaragua was chosen because it has clear food security pressures and significant internal inequality, notably between its Pacific and Caribbean coastal regions, which make it an important place in which to study in-region differences in food security. Moreover, its current food insecurity issues are likely to be exacerbated because of land disputes and the country's susceptibility to threats such as climate change.

### *1.2.1: Location and key information*

Nicaragua is the second poorest country in the Western hemisphere behind Haiti. In 2009, 65 percent of Nicaraguans were considered to be poor by the country's national bank (Cigarán, Gutiérrez and Zamora, 2009). Nicaragua has a history of food insecurity and although the overall level has decreased impressively quickly in recent years, there are still extensive regional and demographic disparities. These differences are partly caused by the multiple social inequalities that exist as a result of the country's history. As mentioned, the most noteworthy inequality is that which exists between the west of the country (known as the Pacific Coast) and the east of the country (known as the Caribbean Coast). This inequality has largely resulted from the different histories of these regions, described in Section 1.2.2 (below). Nicaragua has had a turbulent history, but has enjoyed relative peace and stability for the last quarter of a century.

Nicaragua is located in Central America, bordered by Costa Rica to the south and Honduras to the north. Its location is shown in Figure 1.1 (below).

**Figure 1.1: The location of Nicaragua in Central America**



Source: Author

The country has an area of 130,375 km<sup>2</sup> and had a population of 6.01 million in 2012 (INIDE, 2012). Spanish is the official language of the country but there are seven other recognised languages spoken predominantly by minority ethnic groups who live either in the Bosawás Biosphere Reserve in the northern lowlands or on the Caribbean Coast.

The country's climate can generally be separated into three parts – the Pacific lowlands, the central highlands (considered to be part of Pacific Nicaragua) and the Caribbean Coast. The southern autonomous region of the Caribbean Coast, where the Rama communities are located, has a tropical climate with average temperatures of 25 to 30°C. It has a very high average annual rainfall of between 2500-6000mm (Coe, 2008); considerably wetter than the Pacific lowlands.

### *1.2.2: A short history of Nicaragua*

The Spanish first settled what has become the Pacific coast of the modern-day state of Nicaragua in the early 16<sup>th</sup> Century. The Caribbean coast was not formally settled by the Spanish, who “alternated between policies of systematic extermination and of

enslavement of the aboriginal population” (Bourgois 1981: 27). This separation from Spanish influence was maintained after the English, looking to undermine the Spanish in Central America, built an alliance with the indigenous groups of the region (Bourgois, 1981). In 1687, the coast from Trujillo in modern-day Honduras to the Chiriqui Lagoon in modern-day Panama was declared an English possession (Loveland, 1973). The English (and subsequently the British after the 1707 Union) crowned a succession of local so-called Miskito Kings who nominally ruled over the entire Caribbean Coast. Nicaragua became an independent republic in 1838. British influence had begun to wane by the mid 19<sup>th</sup> Century and in 1860, the British signed the Treaty of Managua, which recognised Nicaragua’s sovereignty over the Caribbean Coast, and the Miskito Reserve was established giving the region some degree of autonomy.

The US established its influence in the region during this period—firstly through missionaries and then through extractive corporations when the extent of natural resources, including gold, silver, mahogany, rubber and bananas, became known (Loveland 1973; Episcopal Conference of Nicaragua, 2014). Many Afro-Caribbean peoples arrived either as slaves or seeking wage work in these new industries, which were protected by US Marines (Bourgois 1981). Thus emerged five of the six different ethnic groups that live on the Coast today: the Indigenous Miskito, Mayanga and Rama groups, and the Afro-Caribbean Creoles and Garifunas (Arana, 2003). The sixth group consists of Pacific Nicaraguans called Mestizos<sup>2</sup> who have migrated to the region. The number of Mestizos moving to the Caribbean Coast has particularly increased in the last thirty years (Riverstone, 2004). Their arrival and settlement is controversial and will be revisited at several times through this thesis. The Nicaraguan state formally annexed the region through violence in 1894 (Loveland 1973), but American companies who employed the Costeños<sup>3</sup> continued to *de facto* administer the region (Bourgois 1981). The US occupied the whole of Nicaragua between 1912 and 1933, largely to protect its commercial interests from turbulent local politics. Anastasio Somoza Garcia took control of the country in 1936 with US backing and he, and his sons in turn, ran the country as a dictatorship for the next four decades. As before, the Caribbean Coast remained in the *de facto* control of foreign-owned companies. This era of wide-scale employment was idealised by many Costeños as “company time” (Gordon, 1998).

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<sup>2</sup> Pacific Nicaraguans are variously referred to as Spaniards, Nation, Terceros and Foreigners by indigenous and Afro-Caribbean Nicaraguans who live on the Caribbean Coast, but this thesis will use Mestizos as it was the term most frequently used by the Rama

<sup>3</sup> Residents of the Caribbean Coast, normally referring to indigenous and Afro-Caribbean Nicaraguans

The Somoza regime was authoritarian and (amongst many Pacific Nicaraguans at least) very unpopular by the late 1970s. The denunciation of its human rights record by the international community, the catastrophic 1972 Managua earthquake and the government's subsequent response, and the removal of tacit US support by the Carter administration heightened the regime's decline and unpopularity (Melrose, 1989; Steinmetz, 1994). The internal resistance emerged as the Frente Sandinista Liberación de Nicaragua (FSLN)<sup>4</sup> – a revolutionary force with ties to communist, revolutionary governments such as Fidel Castro's in Cuba. The FSLN's revolutionary war against the Somoza regime triumphed in 1979 with Daniel Ortega emerging as the new president. A democratic election was held in 1984 and the FSLN achieved 63 percent of the vote, returning Ortega as president.

Because of the Somoza regime's largely *Laissez-Faire* attitude towards the Caribbean Coast, many Costeños did not feel "liberated" by the revolution (Hale, 2017). Although the FSLN arranged parliamentary representation for the locals, created an indigenous lobby group and initiated bilingual education in Miskitu and Creole communities (Bourgeois 1981), many of their initiatives were much less successful. Health policies did not respect local traditions and organisations, and the women's and farmers' groups that were so successful in the Pacific region became embroiled in inter-clan and inter-family disputes (Moore, 1986). This created bad blood between the new FSLN administration and many Costeños.

The emergence of a new communist government in the region during the height of the Cold War was perceived by the incoming Reagan administration in the US as a threat to American strategic interests. The US financed an illegal counter-revolutionary war – now referred to as the Contra War – and enforced economic sanctions, including blocking the country's access to Western lending agencies (Melrose 1989; Conroy, 1990). The cost of the Contra War to the Nicaraguan economy is estimated at between \$1.5 billion and more than \$4 billion (Conroy 1990). In 1987, half of the country's budget was spent on propagating the war (Melrose, 1989).

Many Costeños joined the US-backed Contras fighting the Nicaraguan government. The FSLN retaliated by imprisoning leaders and forcibly removing many indigenous individuals from their homelands (Moore 1986; Sánchez, 2007). Taking the country as a

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<sup>4</sup> Sandinista National Liberation Front

whole, 30,000 people were killed and 350,000 were displaced during the war (Melrose, 1987). The damage to the relationship between the government and most Costeños was extensive and ultimately, regional autonomy was granted in 1987 (Sánchez, 2007). The Caribbean Coast was divided into two separate regions, known today as the Región Autónoma de la Costa Caribe Norte (RACCN) and the Región Autónoma de la Costa Caribe Sur (RACCS). By this time, however, the majority of the Caribbean Coast's natural resources had been extracted and little of the wealth they had generated had been used to the advantage of the local population.

The economy of Nicaragua declined rapidly between 1979 and the 1990 election due to the Contra War, US sanctions, denial of loans from international organisations, chronic domestic inefficiencies and the effects of Hurricane Juana (Joan)—detailed later in this chapter (Melrose 1989; Anderson, Lewis-Beck and Stegmaier, 2003). Urban real-wage levels fell to less than 10 percent of what they were before the Revolution (Conroy 1990). The FSLN responded to this economic decline by making cuts to the social programmes designed to improve the lives of poor Nicaraguans upon whom the FSLN heavily relied for electoral support (Conroy 1990). The 1990 election was therefore more closely fought and overt US backing for the candidates of the Unidad Nicaragüense Opositora (UNO)<sup>5</sup> party convinced the electorate that a vote for the UNO would end the US embargo and, more importantly, the Contra-war (Anderson, Lewis-Beck and Stegmaier, 2003; Conroy 1990). The UNO candidate, Violeta Chamorro, duly won the election.

During the 1990s, a series of corruption scandals harmed the country's economic recovery and the reputation of the UNO (Brown, 2000; Luis Rocha, Brown and Cloke, 2011). In the 2006 election, Daniel Ortega won the presidency and remains the incumbent. Since 1990, the country has been at peace and is now considered one of the safest in the region (PNUD, 2013; WEF, 2017). The country's economy is heavily reliant on agriculture (particularly coffee production), fishing and cattle raising. The 2008 Financial Crisis hit Nicaragua especially hard. The country was particularly vulnerable to the effects of the slow-down of the US economy. This was because Nicaragua is highly dependent on both American consumer demand for its export commodities and for wage remittances from nationals working in the US (Dumazert *et al.*, 2009). Remittances, for example, are the second largest income stream in Nicaragua

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<sup>5</sup> United Nicaraguan Opposition

after agriculture, representing 13 percent of the country's Gross Domestic Product (GDP) (Dumazert *et al.*, 2009). In recent years the Nicaraguan government has promoted the building of an inter-oceanic canal between the Caribbean and Pacific coasts, cutting through Lake Nicaragua. A Chinese firm was commissioned, but progress has stalled amid financial and political problems and in the face of challenges by the Rama and environmental organisations.

The Caribbean Coast remains the poorest region in the country with even the relatively thriving city of Bluefields suffering from high unemployment and underemployment, poor infrastructure, weak government institutions and myriad social problems (Mitchell, Steeves and Hauck Perez, 2015; Episcopal Conference of Nicaragua 2014). This divide between Nicaragua's coastal regions, and the ethnic complexity that exists on the Caribbean Coast was what first piqued my interest in studying Nicaragua.

### *1.2.3: Food security challenges*

In part because of the historical turmoil faced by Nicaragua, the country has suffered with food security problems throughout its history. The 1998 Nicaragua Demographic and Health Survey found one out of every four children was chronically malnourished and nine percent of all children severely malnourished (David, Moncada and Ordonez, 2004). In 2004, Nicaragua had the highest malnutrition rate in Latin America (HabibMintz, 2004). Government policies targeting improved food access for lower income households, a slowdown in population growth and an increase in grain production levels has led to progress in recent years (Rosen *et al.*, 2014), but there is still widespread inequality, most notably between rural and urban areas (David, Moncada and Ordonez, 2004; Dumazert, 2008). Amongst rural households in 2011, 18 percent were chronically food insecure and an additional seven percent were temporarily food insecure (Karfakis *et al.*, 2011). There has also been a rise in the prevalence of obesity and overweight, which is partly due the shift towards more Western diets (Contreras *et al.*, 2016). There is no disaggregated data available for the Caribbean Coast.

As with other countries in the region, most Nicaraguans purchase most of their food (Magrin *et al.*, 2014) and as such they are sensitive to food price changes. The food



price increases in Nicaragua during 2007-9 led to rising poverty (Porter *et al.*, 2014). The indigenous groups in the Bosawás Biosphere Reserve rely more on food they have produced or caught themselves rather than food they have bought (Personal Observation, 2015), so one of this study's objectives was to investigate this balance amongst the Rama.

Agriculture is the most important sector in the Nicaraguan economy and therefore land access is a vital consideration for poverty alleviation and food security in the country (Davis and Stampini, 2002; Karfakis *et al.*, 2011). There is a very unequal distribution of land ownership in the country and high levels of tenure insecurity (Deininger, Zegarra and Lavadenz, 2003). Throughout the country's history, the agricultural frontier has advanced eastwards (into the autonomous regions of the Caribbean Coast) and large areas of indigenous territory have been settled by force (Finley-Brook, 2016; Morris, 2016). This threatens indigenous livelihoods and contributes towards ecological destruction and land trafficking (GTR-K, 2007; Finley-Brook, 2016).

Those with poorer access to land are more at risk of food insecurity (Sen, 1981). Policies aimed at reducing food insecurity have tended to focus on boosting productivity, but a number of studies have shown this does not solve initial land inequality. For example, a study by Samarasinghe and Samarasinghe (1984) on the Sri Lankan Dry Zone showed the technology introduced during the Green Revolution was unable to reduce the initial inequality that existed due to the unequal size of the government-gifted land holdings. For this reason, land will be discussed throughout the thesis and it is worth briefly discussing the history of land tenure on the Caribbean Coast at this stage.

After the Caribbean Coast was annexed in 1896, then Nicaraguan President José Santos Zelaya granted large parcels of land to his allies. Few of the owners ever used or even visited the land, but some modern-day land speculators have claimed ownership to indigenous lands based on these historic titles (Riverstone 2004). During "company time" (approximately 1880-1940), there were large influxes of migrants, and this increased the pressure on the land (Baldi, 2013). In the 1960s, "the colonization of Caribbean lands from the west was coupled with their privatization, resulting in the transformation of forests into cattle ranches and banana plantations" (Baldi 2013: 60).

This reduced the land available for the Rama (and other Costeños) and restricted their movement across their territory (Riverstone 2004; Baldi 2013).

When they came to power in 1979, the FSLN embarked on a policy of redistributing resources previously held by powerful individuals connected to the Somoza regime. This process was not well administered, however, and it meant that the beneficiaries were often unable to use the land as they were drawn into protracted disputes (Deininger et al. 2003). The private property land tenure system imposed by the state does not respect the Caribbean Coast's traditional communal lands customs (Episcopal Conference of Nicaragua 2014), and the regulations governing indigenous groups' rights to land are not effectively governed (Finley-Brook, 2016; Morris, 2016).

Land policy reforms post-1995 meant land ownership throughout the country has broadened (Davis and Stampini 2002), but inequality and high levels of tenure insecurity remain (Deininger, Zegarra and Lavadenz, 2003). There will be further discussion about the importance of land rights for the Rama in Section 2.4.6 of the literature review (chapter two).

Climate change is likely to affect the region's future food security. The average temperature in Nicaragua between 1971 and 2010 increased by 1.1°C, which is considerably higher than the global average of 0.6°C, and there has been an increase in temperature variability (Karfakis *et al.* 2011). Karfakis and colleagues (2011) used time series data combined with survey data from rural households in Nicaragua and found that crop yields would be significantly reduced if average temperatures increase. Although it is difficult to ascertain the extent to which this temperature discrepancy (1.1°C vs 0.6°C) and variability is due to climate change, this trend matches the expectations of climate change models (IPCC, 2007). Changes in total annual rainfall and increased variability in precipitation levels is also likely to affect food security in Nicaragua. In 2015, coffee growers' income was hit as their harvest succumbed to coffee rust (known locally as La Roya), which was caused by reduced levels of precipitation in the principal coffee-growing regions (Castellón, 2015). In September 2014 food aid was delivered to indigenous groups living in the Bosawás Biosphere Reserve in the north of the country as there was a shortage of food due to a drought (Change for Children, Personal Correspondence, 2015). Again, although it is difficult to ascertain the extent to which these changes in total annual rainfall and increased

precipitation variability are due to climate change or natural variability, there is evidence to suggest climate change is a significant driving factor (Karfakis *et al.*, 2011).

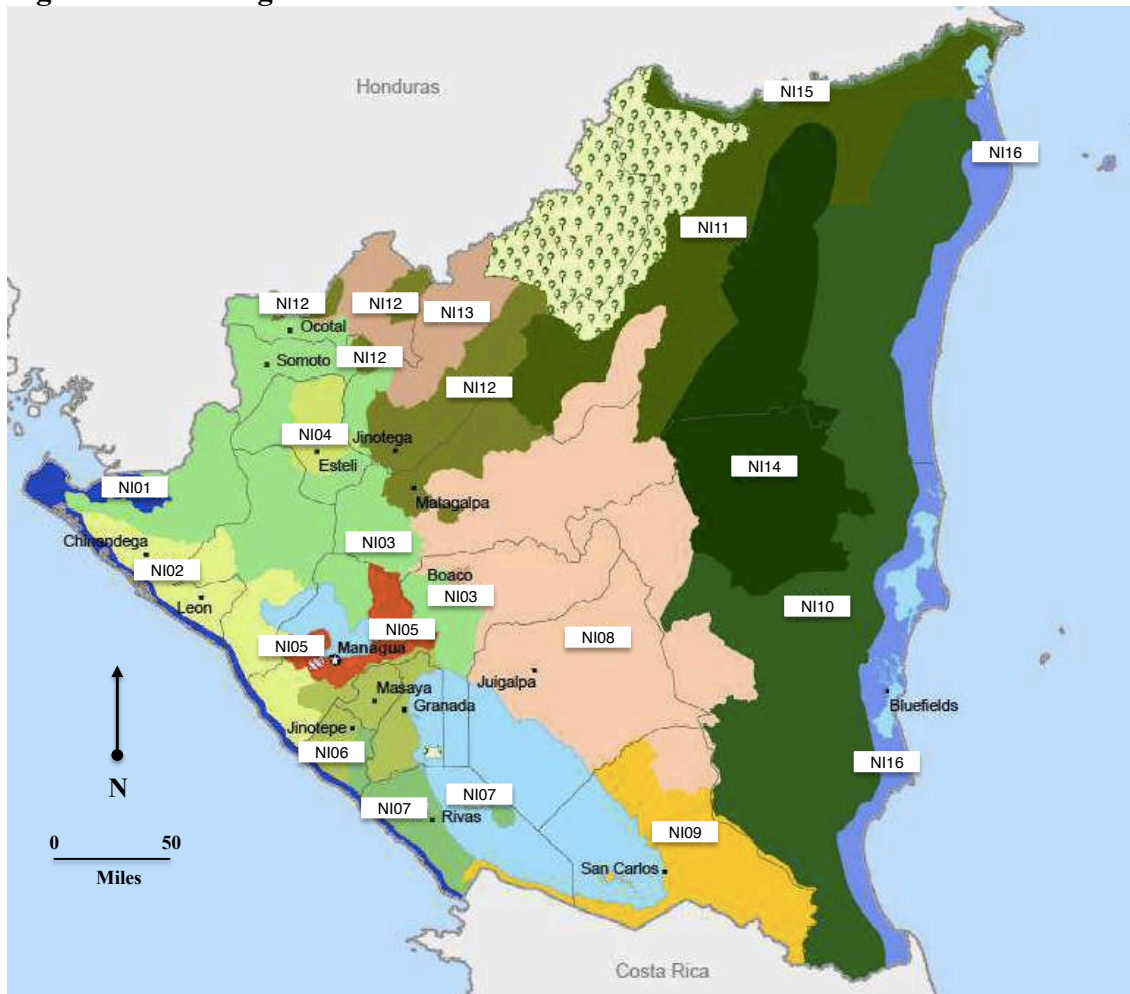
The region is threatened by extreme weather events such as floods and tropical storms, and these are likely to increase due to climate change (Maslin, 2013). The 2013 Germanwatch Global Climate Risk Index ranked the country as the third most vulnerable to extreme weather events (Harmeling and Eckstein, 2013). An example comes from Hurricane Juana (Joan) in 1988, which caused significant lasting damage to the region's infrastructure and vegetation (Roth, 1992). Hurricane Juana was a category four hurricane that hit Nicaragua with winds of up to 145mph. It killed 148 people in Nicaragua (with a further 100 unaccounted for), made around 70,000 people homeless, caused widespread ecological damage and cost the country an estimated US\$840 million (Melrose, 1989). Almost all of the structures in the Caribbean Coast city of Bluefields were demolished (Envio, 1988).

#### *1.2.4: Choosing the study population*

An initial scoping review of the literature highlighted the work of the Food Economy Group (FEG) – a food security consultancy based in the US – who produced the Livelihoods Zones map of Nicaragua shown in Figure 1.2 (below) as part of a Household Economy Analysis (HEA) assessment. This map depicts the most common livelihood strategies used in different regions across Nicaragua. For example, it shows that people who live in the Caribbean Coast Traditional Fishing Zone (N16) are most likely to source their food through fishing,

After discussing my project with a number of academics, Non-Governmental Organisations (NGO) workers and other Nicaraguan experts, I showed the map to each and asked them where they thought would be a suitable location for my research. Four potential case study sites were selected and I visited each of these during a preliminary visit to Nicaragua in January 2015. These were the Bosawás Biosphere Reserve, the Departments of Matagalpa and Masaya – both of which are agricultural regions where there is an uneven distribution of land and resources – and the city of Bluefields, which is the administrative centre of the RACCS.

**Figure 1.2: Nicaraguan Livelihood Zones\***



Source: Browne (2009)

*\*According to the Food Economy Group (FEG)—a food security consultancy based in the US; For the map key, please see the following page; The Rama live in Zone NI16*

Through conversations with local key informants when visiting Bluefields, the Rama communities were identified as a potential study population. A visit to the island of Rama Cay and meetings with community leaders confirmed its suitability for this project. The final decision about where to base this research project was made in concert with my supervisors in early February 2015. The chosen location is highlighted in Figure 1.3 (below) and Figure 1.4 (pg. 37).

Table 1.2: Description of Livelihood Zones outlined in Figure 1.2 (above)\*

<b>Livelihood Zone</b>	<b>Description</b>
NI01	Pacific Coast export, fishing, aquaculture and tourism zone
NI02	Pacific agro-industrial and transitional agricultural zone
NI03	Northwest subsistence agriculture, livestock and alternate income activities zone
NI04	Esteli traditional and industrial tobacco zone
NI05	Managua peri-urban free-trade, agro-industry and services zone
NI06	East-central vegetables, informal trade, industry and tourism zone
NI07	Southern Pacific agriculture and high migration zone
NI08	Central cattle and agricultural frontier zone
NI09	Agriculture and livestock with high migration to Costa Rica zone
NI10	Caribbean humid tropical agriculture zone
NI11	Northern Atlantic agricultural frontier and mining zone
NI12	Coffee with commercial agriculture and livestock zone
NI13	Northern market-bound basic grains, livestock and coffee zone
NI14	Communal forestry zone
NI15	Coco River traditional agriculture zone
NI16	Caribbean Coast traditional fishing zone

Source: Browne (2009)

\*According to the Food Economy Group (FEG)—a food security consultancy based in the US

The following section will outline a brief history of the Rama and the settings of the three Rama communities where the study was conducted.

**Figure 1.3: Map of Nicaragua\***



Source: Author

\*The area outlined in the red box corresponds to the area depicted in Figure 1.4 (below); The RACCN refers to the *Región Autónoma de la Coste Caribe Norte*, or the northern autonomous region of the Caribbean Coast, and RACCS refers to the *Región Autónoma de la Coste Caribe Sur*, or the southern autonomous region of the Caribbean Coast.

### 1.2.5: The Rama

The Rama are an indigenous people unique to Nicaragua and one of the six ethnic groups that live on the country’s Caribbean Coast. The current population is estimated to be around 1,500 people (GTR-K, 2007), but the exact size of the entire Rama population is unknown because the most recent formal census in Nicaragua was in 2005 and the literature suggests Rama families frequently migrate between communities (Baldi, 2013). A nationwide census is currently in progress and this should provide further information about the size of the Rama population.

The Rama have been characterised as a subsistence community reliant on agriculture, fishing in rivers, the ocean and Bluefields Bay, hunting on nearby islands, and foraging, but their economy has become increasingly monetised in recent years (Riverstone, 2004; Coe, 2008; Personal Observation, 2016).

Genetic studies have demonstrated that the ancestors of Chibcha language<sup>6</sup> speakers have inhabited Central America for 10,000 years (Sewell, 2015). Rama Elders trace their contact with Europeans to 1502, when Christopher Columbus landed near present-day Monkey Point and kidnapped two locals (Riverstone, 2004).

An Indian group called the Rama did not appear until the 18<sup>th</sup> Century, but a number of Europeans recorded contact with indigenous groups in the area including the Kukra, Melchora, Caribes, Guatuso, Voto, Suerre, Corobici and Gueter (Sewell, 2015; Riverstone 2004; Melton, 2005). As different accounts overlap in space and time it is possible that some of these were, in fact, the same group being encountered by different Europeans and some may have been integrated into, or been a subgroup of one another.

Grossman (1988) argues that Voto was the Spanish name for the Rama, citing the Spanish Army General Pedro de Rivera who recorded this as the name of the inhabitants of Punta Gorda village in 1742. Riverstone (2004) concludes that there are two schools of thought: either that the Rama were descended from peoples variously called Melchoras, Caribes and Voto who inhabited the territory they claim today as well as an area extending westwards towards Lake Nicaragua; or alternatively that the Rama actually descend from peoples called the Corobici and Guatuso and inhabited a territory centred in the northwest of modern-day Costa Rica and perhaps an area in the south of modern-day Nicaragua.

In 1710, the Nicaraguan governor removed the Caribes from the upper Rio San Juan because they had been (forcibly) assisting the British who had been using the area as a base to raid Spanish ships and plantations (Riverstone 2004). Riverstone (2004) argues this removal may have resulted in the group being divided in two, with the eastern group eventually becoming the Rama. During this period, the indigenous peoples that became the Rama were under constant pressure (from war, forced removal and disease) at the hands of the Miskito, British and Spanish (Grossman 1988, Riverstone 2004). At

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<sup>6</sup> The root language from which the Rama language derives

some point in the late 18<sup>th</sup> Century, the Rama settlement of Rama Cay (in the Bluefields Lagoon) was founded, possibly because the Rama were given the island as a gift from a Miskito King as a reward for their help in an expedition into modern-day Costa Rica (Grossman 1988, Riverstone 2004). Being so close to Bluefields, the settlement of Rama Cay “put the Rama into sustained contact with different cultural influences” (Riverstone 2004: 46). The Rama are likely to have inherited their current surnames from British buccaneers and Creole merchants during the eighteenth century, and later Spanish influences after the annexation of the Caribbean Coast by Zelaya (Baldi, Melton and Crawford, 2014).

In 1820, Grossman (1988) states there were probably around 800 Rama. In 1858, a Moravian missionary called Hans Paul Juergenson established a church on Rama Cay and imposed on the Rama new types of clothing, housing, education, child-rearing practices, a new moral code, and the use of English (Baldi 2013).

As previously mentioned, the period approximately from 1880 to 1940 was known as “company time” when foreign companies extensively extracted the resources of the region (Baldi, Melton and Crawford, 2014). Some land cultivated by the Rama was taken over during this period and consolidated by commercial landowners (Riverstone, 2004). More Rama families relocated to the island of Rama Cay during this period to avoid epidemics and abuse (GTR-K, 2007; Baldi, Melton and Crawford, 2014). In the middle decades of the 20<sup>th</sup> Century, agricultural expansion accelerated and there was an increase in the number of Mestizos settling on Rama lands (Baldi, Melton and Crawford, 2014).

During the Contra War, colonists were evacuated from the land by the Sandinistas as part of an effort to starve the Contra of support, and much of the land began to revert to secondary forest (Riverstone, 2004). In 1984, a group of Contra guerrillas arrived on Rama Cay causing the Rama to flee. The Sandinistas responded with an unsuccessful two-day attack followed by an air strike that destroyed the island. The guerrillas had long since departed. Some Rama returned to Rama Cay to live under martial law, whereas others fled to other Rama territories or lived as refugees in Bluefields (Riverstone 2004). The pace of migration from Pacific Nicaragua to the Caribbean Coast increased during the 1980s and the 1990s, increasing the pressure on the Rama’s resources for hunting, fishing and farming (Baldi, Melton and Crawford, 2014).



The Nicaraguan government passed Law 445<sup>7</sup> in 2003, which gave indigenous groups on the Caribbean Coast the right to claim, demarcate, use, manage and administrate communal territories (Morris 2016). From this, the Rama and Creole populations settled in the southeast of the country established their own Indigenous Territorial Government (GTI) called the Rama-Creole Territorial Government (GTR-K) to administer their own Rama-Creole Territory (See Figure 1.4 below).

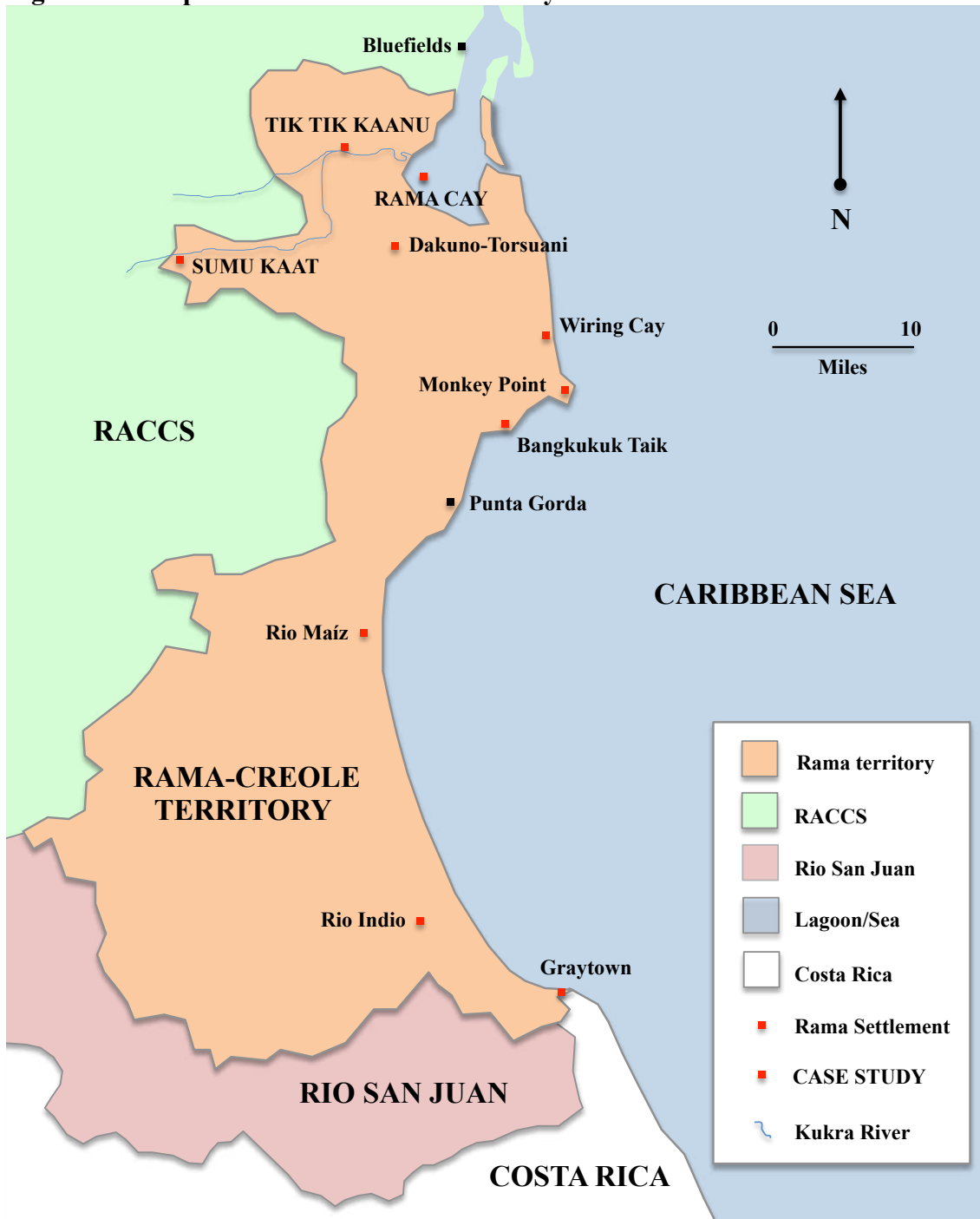
The map below should only be viewed as indicative, however, because the Rama territory is, in practice, not demarcated, administered or even contiguous. This will be discussed further in Section 2.4.2 of chapter two.

The Rama communities include Rama Cay, Tik Tik Kaanu, Sumu Kaat, Dakuno-Torsuani, Wiring Cay, Bangkukuk Taik/Cane Creek, Rio Indio and Rio Maíz. The Rama were evacuated from the community of Punta Gorda during the Contra War and it has since been settled exclusively by Mestizos (Riverstone, 2004). Some Rama also live in Monkey Point and Graytown, which are joint Rama-Creole communities and some individuals with political or administrative roles live in Bluefields. The proposed inter-oceanic canal would cut through the Rama territory and likely require the residents of Bangkukuk Taik to move elsewhere.

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<sup>7</sup> The background to Law 445 will be explained in detail in Section 2.4.2 of chapter two

**Figure 1.4: Map of the Rama-Creole Territory and Rama settlements**



Source: Author

*1.2.6: The three communities*

The fieldwork was conducted in the communities of Rama Cay, Tik Tik Kaanu and Sumu Kaat. This was mainly because the majority of the Rama population live in these three communities and also because of logistical and budgetary constraints. This will be expanded on in the methodology chapter (chapter three).

Rama Cay is a small island located within the Bluefields Lagoon about 10 miles to the south of the town of Bluefields (Baldi, Melton and Crawford, 2014). The island is approximately 0.11 square miles in size and consists of two landmasses separated by a swamp that has been “filled with mollusk shells and other materials by the islanders to serve as a bridge”<sup>8</sup> (Baldi 2013: 75). There are approximately 80-100 households on the island and over 80 percent of the entire Rama population live there at any one time (Coe 2008; Riverstone 2004).

Rama Cay, as with the rest of the Caribbean Coast, has an easterly prevailing wind, bringing a cool breeze across the lagoon. This breeze makes the eastern side of the island much cooler than the west side of the island. The most sought out locations thus tend to be on the eastern side and clustered around the central part of the island where the central square is located, which is bounded by the primary school and the communal hall (called the multi-use by the Rama). The health centre is located immediately to the rear of the multi-use. In 2015, the more wealthy residents tended to live in these locations in better built homes, with those living in less well-constructed homes and environments on the west side of the island near the municipal dock. A housing project providing new houses to most people who live on the island had started before the first visit to the island in 2015 and this had made the distinction between wealthy families and the less well off less obvious in 2016. Because families were required to contribute either money or labour towards the building of their own homes, however, there was still an inequality in housing conditions. At the beginning of the fieldwork period, the only area with no new homes was the west of the island near the municipal dock. By June 2016, only one or two families in this area were building new homes.

To the east of the island, there are other uninhabited islets including Walker Cay, Skwallup Cay and Mission Cay. The Rama pick oysters and cockles from the shores of these islands. Further to the east, the wide sand bar (called Deer Cay) between the lagoon and the sea and a spur connected to the mainland further south offer some opportunities for farming, but most Rama farm on the western side of the lagoon. The Kukra River – an important navigation and fishing resource for the Rama – meets the lagoon just over one mile to the northwest of Rama Cay.

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<sup>8</sup> A Rama legend states that those Rama who had committed indiscretions within the community were punished by being given the task of building the bridge between the two former islets

Tik Tik Kaanu is laid out along both banks of the Kukra River, approximately six miles from where the river meets the lagoon close to Rama Cay. The community is approximately half a square mile in size and is more sparsely populated and spread out than Rama Cay. Households fish in the Kukra River and the Bluefields Lagoon, grow crops on their plantations and herd cattle on a small scale within the community itself. There is a school and electric streetlights powered by the national grid. Previously, the Rama inhabited land along some of the tributaries to the River Kukra, but these have now been settled on by Mestizos and the Rama no longer go into these areas (Riverstone, 2004). Starting in about 1997, a number of Mestizo families have also established homes within the boundaries of the community (Riverstone, 2004).

Sumu Kaat is also situated along the Kukra River, further inland from Tik Tik Kannu and about 24 miles from Rama Cay. It is located very close to the western extremity of the Rama-Kriol territory. The river is not deep enough to be navigable by motor-powered boats during the dry season. Instead the community can be accessed from Rama Cay using a dory or by taking a public or private truck from Bluefields to the town of San Pancho and then a three-hour mule ride or a four hour walk. The banks of the river rise steeply in most places within the community and the focal point of the community is a hill called Cerro David (Riverstone 2004). Unlike Tik Tik Kaanu, no cattle are herded within the confines of the community and there is only one open space close to the multi-use and the school – the latter was opened in 1999 (Riverstone, 2004). Sumu Kaat consists largely of individual houses connected by tracks running through the plantations farmed by the residents. As with Tik Tik Kaanu, the Rama land is under threat from Mestizo settlers with Riverstone (2004) able to point to four specific Mestizo households living within the lands belonging to the community.

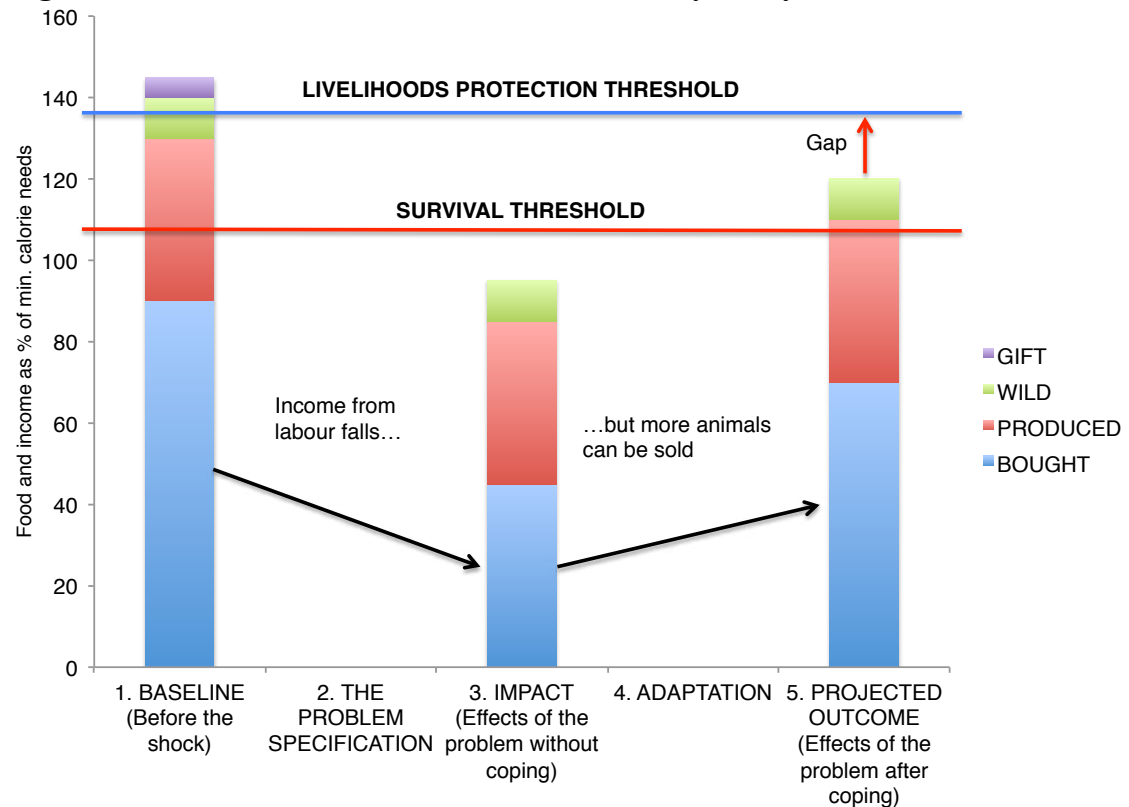
The following section of this chapter (Section 1.3, below) will discuss the methodological framework used, which will then be discussed in more detail in the methodology chapter (chapter three).

### **1.3: Household Economy Analysis**

This thesis uses an adaption of an Emergency Food Security Assessment (EFSA) tool called the Household Economy Analysis (HEA) framework. The framework and how it

was adapted will be discussed in more detail in the methodology chapter (chapter three), but it is worth briefly describing its five stages (shown in Figure 1.5 below) as this has a bearing both on the aims and objectives of the study, outlined in the following section, and the structure of the thesis, which is outlined in Section 1.5 (below).

**Figure 1.5: A schematic of the Household Economy Analysis**



Source: Adapted from Boudreau *et al.* (2008)

The first stage of the HEA is the Baseline, which covers what food is eaten in the community studied, how much is eaten and how it is sourced. The second stage is the Problem Specification, which is determined by the threats to food security that the population faces. These might include social, economic or environmental factors. The third stage is the Impact, which tracks how the threats to food security outlined in the Problem Specification (Stage 2) might impact on the population's ability to maintain the level of food security outlined in the Baseline (Stage 1). The fourth stage – named Coping by the HEA, but changed to Adaptation for this research project – outlines how the population studied is likely to adapt when their food is threatened. These adaptations can be spontaneous or planned and can be characterised into different adaptation types. The final stage is the Projected Outcome, which tracks the possible impact of the adaptation to threats that is described in Stage 4.

#### **1.4: Project aims and objectives**

This brief section will outline the project's aims and objectives. As mentioned, these are derived from the gaps in the literature (as highlighted in Section 1.1 of this chapter) and the stages of the HEA framework, which was adapted as the methodology of this thesis (as highlighted in the previous section).

##### **Project Aims:**

1. To explore the extent and nature of the Rama's current food security;
2. To determine and explore the reasons for vulnerability to food insecurity amongst the Rama;
3. a) To explore the Rama's past responses to threats to their food security; b) To explore the reasons that may have limited the implementation or effectiveness of the Rama's responses;
4. To assess the HEA framework's suitability to measure food security in this and other settings.

##### **Project Objectives:**

1. To describe the types of food the Rama eat, how much they eat, and the differences between the three communities that were studied;
2. To describe the livelihood strategies of the Rama (how they acquire their food) and the differences between the three communities that were studied;
3. To determine what threats the Rama perceive to their food security;
4. To analyse the potential impact of these threats on the Rama's food security;
5. To investigate the role that social, economic and environmental factors play in exacerbating any of the highlighted threats to the Rama's food security;
6. To investigate how the Rama respond to these threats to their food;
7. To determine how these responses have changed over time;
8. To investigate what barriers have hindered the ability of the communities to respond to these threats;
9. To assess the effectiveness of the adaptation of the original Household Economy Analysis (HEA) framework to explain all the elements of food security (availability, access, utilisation and stability) at the local level.

## **1.5: Structure of the thesis**

The literature review (chapter two) will critically analyse the relevant literature more extensively and further highlight the gaps to which this thesis will contribute. It reviews the history of the concept of food security and explains how food insecurity is caused by multiple factors. The review discusses the vulnerability and resilience literature and critically analyses the constructive tensions that exist in the concepts. The chapter then discusses the ways in which communities respond to threats to their food insecurity and presents information on those issues that are important to food security at the local level, including culture and food sharing practices.

The methodology will be outlined in chapter three. It will describe the Household Economy Analysis (HEA) in more detail and explain how it was adapted. It will explain the individual methods used (surveys, interviews and observations), describe the process of ethical approval and important ethical considerations, before describing the data collection and analysis.

The five empirical chapters that follow the methodology are broadly structured around the five stages of the HEA (described in Section 1.4 above). The first empirical chapter (chapter four of the thesis) will describe the types and amount of food the Rama eat, and how and where they source this food – collectively the Rama’s foodways. The data presented in this chapter represents the Baseline stage of the HEA. The chapter will discuss the livelihood strategies used by the Rama, including traditional ones such as fishing, farming and hunting, and non-traditional livelihood strategies such as informal and wage labour, running small businesses and remittances. It will also explain the differences that exist between the three communities with respect to their food practices and discuss the reasons for these. This chapter offers the first analysis of the food practices of the Rama.

Chapter five outlines the threats the Rama perceive to their food security. It will show that the most important of these threats is the weather, but cautions against over-attributing causality to weather/climate. It argues there are multiple factors that affect the food security of the Rama including the encroachment of non-Rama farmers and fishermen into the Rama territory, overuse of resources and the lack of reliable work in

the region. It represents the Problem Specification stage of the HEA. The chapter will draw primarily on the interview data.

Chapters six and seven show how the weather has an impact on the food security of individual Rama households. They jointly represent the Impact stage of the HEA.

Chapter six models the impact of a drought and a flood on the Rama's ability to meet their nutritional needs. To do this it draws on dietary surveys conducted with nine families and the information about the impact of these climate shocks drawn from the interviews. It suggests that all the families who did the dietary surveys were not eating sufficient calories for their requirements and that at least one of the modelled scenarios would cause them to go hungry. It also suggests that the impact of the modelled events would affect households to different extents. The chapter highlights that the original HEA framework is less able to note the heterogeneity of vulnerability that may exist within small communities and that it is not able to reveal how the modelled threats might interact with other unspecified threats.

Chapter seven shows how certain weather conditions differentially impact Rama Cay households' ability to catch fish. It shows that the wealth of Rama families changes their perception about what they consider to be 'bad' weather. This is because wealthy individuals can purchase fishing equipment (motor boats and gill nets) that can be used in more varied weather conditions. As a result they are more likely to view windy weather as 'good' than those who fish using the traditional methods of hand nets and paddle-powered canoes. The data for this chapter mainly come from interviews conducted with Rama Cay residents. The chapter will argue that societal change and climate change are likely to reinforce inequality in relation to food security.

Chapter eight is the final results chapter and it will look at how the Rama have adapted to threats to their food in the past. It represents the Adaptation stage of the HEA. The responses that will be discussed include waiting for the right moment to plant crops, replanting crops that have failed, relying on short-term credit arrangements, buying new fishing equipment, increasing market engagement – including taking up wage labour – and reducing the amount of food they share with others. The fifth stage of the HEA (the Projected Outcome element) will also be touched upon in this section.



The way the different results chapters map onto the stages of the HEA framework are summarised in Table 1.3 (below).

Table 1.3: How the results chapters map onto the HEA stages

<b>Results chapter</b>		<b>HEA Stage</b>
4	The foodways of the Rama	Baseline
5	Perceived threats to the Rama's food	Problem Specification
6	Impact of the weather on Rama food	Impact
7	The Rama's perception of the weather	Impact
8	Adaptations by the Rama in response to the threats to their food	Adaptation (Projected Outcome)

Source: Author

Finally, the conclusion (chapter nine) will summarise the key points of each chapter and the findings and discuss their implications. It will outline the project's limitations and describe the areas where further research is required.



## 2. Literature Review

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This thesis shows how food security risk is stratified within small communities. It uses an adaptation of a household-based methodological framework to assess the challenges to the food security of the Rama indigenous group (Nicaragua) and how they are likely to respond to these challenges.

This chapter will consist of an in-depth review of the relevant literature and give greater detail on the four gaps in this literature highlighted in the first chapter: firstly, there is a paucity of research on the access and utilisation dimensions of food security; secondly, a better understanding is needed of how potential drivers and mediating factors interact to determine food security in small communities; thirdly, there is no ‘gold standard’ measure of food security; fourthly, there is a paucity of research on the stratification of food security resilience within small communities, suggesting a greater theoretical engagement with resilience at the household level is needed.

The chapter is structured into five sections. The first section will define food security by outlining the history of how food security has been conceptualised and show that food insecurity is caused by multiple interacting factors and will be affected by a number of future challenges. It will then discuss how food security has been measured, show that there is no ‘gold standard’ measure of food security and argue that new methods need to be trialled. This section will therefore provide some of the background for the first three gaps in the literature highlighted above.

The second section of the chapter will define resilience, which provides the theoretical groundwork for discussions in the third and fourth sections of the chapter. This will be achieved by highlighting the current constructive tensions surrounding the term. It will argue that resilience needs to include considerations of heterogeneity within communities.

The third section of the chapter will discuss how communities respond to threats to their food insecurity. This will include discussions on coping, livelihood strategies and

adaptation, and will lay the groundwork for the discussion in the results chapters on the differences in food security resilience within the Rama communities.

The fourth section will take a closer look at food security issues at the household level. It will argue that culture, access to land, food sharing practices, and the extent of a community's integration into the market can affect the resilience of a community. Both the third and fourth sections of the chapter will argue that fine-grained research at the household-level is critical to be able to understand all the dimensions of food security (availability, access, utilisation and stability), and all the determinants of food security resilience. The fifth section of the chapter will summarise the chapter's argument.

## **2.1 Food security**

Food security “exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

*FAO, IFAD, UNICEF, WFP and WHO (2017: 107)*

Considering food security as a global concern, rather than as a regional problem or an individual country's concern, arguably began with the establishment of the League of Nations post-WWI (Simon, 2012). In the early 1930s, Yugoslavia proposed that the Health Division of the League of Nations should disseminate information about the global state of food (Shaw, 2007; Simon, 2012). In 1943, US President Roosevelt called for a United Nations (UN) conference on Food and Agriculture after previous attempts to create a unifying global organisation had failed (Shaw, 2007). At this conference, the 44 nations in attendance committed themselves to create a permanent organisation and this occurred in October 1945 with the founding of the Food and Agricultural Organisation (FAO) of the UN. The new organisation's aims were to raise the nutritional standards of peoples in the 44 attendant countries, to improve global food production and distribution, and to expand the world's economy to ensure freedom from hunger (Shaw, 2007). In 1948, the Universal Declaration of Human Rights asserted that having sufficient food was a human right.

The FAO was largely focused on ensuring the maintenance of food stocks and therefore until the 1960s, food security “rested largely on the stockholding policies of the major food exporting countries” (Shaw, 2007: 34). The World Food Programme was established in 1963 to transfer food surpluses to food-deficit people (Maxwell and Frankenberger, 1992; Shaw, 2007; Simon, 2012). In 1972, bad climatic conditions meant there was a dramatic reduction in cereal production and this coupled with the 1973 oil crisis – which increased the cost of transport and fertilizers – led to a rapid increase in food prices (Simon, 2012). At this time, it was assumed that anything that disrupted food production could cause famine as it would mean supply would fail to meet demand (Devereux, 1988; Simon, 2016). This conception of food security, later dubbed as Food Availability Decline (FAD), was a contributory factor in the investment in Green Revolution technologies that led to a tripling of cereal crop production in the 50 years prior to 2012 (Pingali, 2012). In developing countries between 1960 and 2000, wheat yields increased by 208%, maize yields increased by 157% and rice yields increased by 109% (Pingali and Raney, 2005). The Green Revolution should not be blindly portrayed as a success story. The introduction of new technology and seed varieties, and the intensification of water and pesticide use has had many consequences, including increased inequality (in part by advantaging those with credit and excluding small, self-sufficient farmers), and increased poor health, increased greenhouse gas emissions, conflict, and reduced dietary quality and biodiversity (Shiva, 1991; Pingali, 2012; Lang and Barling, 2012; Brainerd and Menon, 2013). It did, however, reinforce the view that FAD was the correct conception of food insecurity, as global-scale hunger was averted by increased yields.

Following the Universal Declaration on the Eradication of Hunger and Malnutrition in 1974, which was partly a response to the African famines of the mid-1970s, the Food Availability Decline (FAD) paradigm was challenged (Devereux, 1988; Mao, Zhao and Yang, 2013). Though similar work was conducted beforehand, Sen’s (1981) seminal work showed that a decline in food availability is neither sufficient nor necessary for famine to develop. This is because food can be transferred from elsewhere and famine can occur even when food production has not declined (Devereux, 1988). Sen (1981) introduced the Food Entitlement Decline (FED) conception of food security, arguing that even if a household is located where there is enough food, they may still be food insecure if they cannot afford to buy enough food for their needs, or if they do not have the ability to acquire it through other means (Tilly, 1983; Osmani, 1993). Put simply,

FAD theorises famine as the result of there not *being* enough food, whereas FED theorises famine as individuals not *having* enough food (Osmani, 1993).

Sen (1981) demonstrated this using the example of the 1943 Great Bengal Famine – that killed between 3-4 million people – to show that food security is more complex than how much food is available. The prevailing discourse of the inquiry into the Great Bengal Famine was that floods had destroyed the rice crop and reduced its availability. Sen (1981) showed there was more food available in Bengal in 1943 than in previous years when there had been no famine. Even taking into account confounding factors (the estimated food stocks that remained from previous years, population growth and food imports being delayed), the amount of food available in 1943 was only slightly lower than in the previous five years, and more than in the famine-free year of 1941. Sen (1981) argued that the 1943 famine was actually caused by the lack of access that low-skilled workers had to food. India's war expenditure had led to inflation and the policy prioritisation of those who worked in industry. This meant those who did not work in industry saw their wages drop in absolute terms just as the price of rice increased rapidly in September 1942. The amount of food available was much the same as in other years, but the access that many individuals had to it was much reduced by their diminished purchasing power. By showing that famines can be caused by problems with access to food rather than food shortages, this example proved that famines are not just caused by reduced food availability.

The FED paradigm engendered the entitlements approach. This states that individuals have an endowment set – resources that they legally own – and that they translate these into an entitlement set – goods and services they obtain through the use of their endowment set (Osmani, 1993). An individual's endowment set is thus transformed into food through production, trade, labour and transfers (Devereux, 1988). Food insecurity can be seen as the result of entitlement failures; either when there is a failure in the way an individual acquires their endowments or in the ways they convert them into entitlements. The entitlements approach views food security as being a construction of four dimensions: availability, access, utilisation and stability (Gregory, Ingram and Brklacich, 2005; FAO, 2006), as outlined in the introduction to this thesis.

Because many disciplines have worked on food security, there have been more than 200 definitions of food security recognised by scholars (Smith, Pointing and Maxwell, 1993;

Maxwell, 1996; Hendriks, 2015). The World Food Summit definition, first negotiated in 1996 and subsequently revised in 2002, is generally accepted and states that food security exists “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life”, with the term “social” added in 2002 (Simon, 2012; FAO, IFAD, UNICEF, WFP and WHO, 2017).

Food security can therefore be seen as encompassing accessibility, affordability and availability of food (Lang and Barling, 2012). This does, however, give less scope for the social and psychological elements of food security, as noted with the mention of “food preferences” in the World Food Summit definition. This is arguably better captured in the utilisation dimension of the entitlements approach to food security. It is important that individuals can consume the food to which they have access—food has to be nutritious, culturally appropriate and locally available to be utilised. If only certain culturally unacceptable foods are available this may reduce welfare and offend human dignity (Oshaug, 1985). Gifted food (in the form of food aid for example) may not have its intended effects if it is not culturally appropriate for a population (Ellis, 2003). The utilisation dimension includes considering health and health services, and household’s access to knowledge on nutrition, processing and storage (Mao, 2013). The utilisation dimension of food security will be covered in much greater detail in Section 2.5 of this chapter, which will discuss the interaction of culture and food.

As can be seen with the emphasis on all these factors, food security studies should aim to understand all the types of food that populations are eating and how they are acquired. These practices are collectively called foodways, defined as the “cultural and social practices that affect food consumption, including how and what communities eat, where and how they shop, and what motivates their food preferences” (Alkon *et al.*, 2013: 127).

Despite this, the amount of food produced (the availability dimension of food security) still tends to be the main focus of attempts to reduce food security (Lang and Barling, 2012; Westengen and Banik, 2016). This is particularly true since the 2007-8 recession, which saw a renewed international focus on food production rather than the previously more nuanced view of food security that had developed partly as a result of the entitlements approach (Lang and Barling, 2012; Westengen and Banik, 2016).

The impact of this change can be seen with three examples. Firstly, most research into the threat of climate change to food security tends to focus on how it will affect food production (Wheeler and von Braun, 2013). Secondly, policy discussions on how to reduce global hunger tend to focus on increasing food supply (Jenkins and Scanlan, 2001). Thirdly, USAID's first response is to distribute food aid, even if the crisis to which it is responding is caused more by food access or utilisation issues (Browne, 2009). More research is therefore needed into the access, utilisation and stability dimensions of food security. One of the aims of this thesis is to contribute towards this.

Food security has a number of 'intellectual neighbours', including food resilience, food sustainability and food sovereignty (Lang and Barling, 2012). It is important to briefly discuss food sovereignty in particular, as it is relevant to the case study of this thesis. Food sovereignty was launched in 1996 by the international movement, La Via Campesina and is defined as "the right of nations and peoples to control their own food systems, including their own markets, production modes, food cultures and environments" (Wiebe, Desmarais and Wittman, 2010: 2). It was developed through a recognition that the industrial, capital-intensive and corporate-led model of agriculture had led to environmental damage, increased urbanisation and a few food producers wielding great power (Wiebe, Desmarais and Wittman, 2010; Lang and Barling, 2012; Bini, 2018).

Food sovereignty highlights the importance of small-scale farming, local production and trade to ensure people have the right to produce, consume and share their own food in a sustainable way (Wiebe, Desmarais and Wittman, 2010; Lang and Barling, 2012; Bini, 2018). The concept therefore has difficulties explaining instances where there are competing demands on the same resources. For example, Wiebe, Desmarais and Wittman (2010) highlight the indigenous Canadian population's right to fish and hunt being balanced against the demands of local agricultural producers. The rights of different competing groups will be discussed in this thesis.

Because of food sovereignty's focus on opposing the industrial, capital-intensive and corporate-led model of agriculture, some scholars have argued that food security and food sovereignty are in opposition to one another. Food security is viewed as reinforcing the dominant neoliberal discourse of development and being concerned with the global and national scales, whereas food sovereignty is focused on the local scale



(Jarosz, 2014; Clapp, 2014). Firstly, however, food security is a descriptive concept, not a normative one. It describes a state – that of being food secure – rather than prescribing how that state is achieved (Clapp, 2014). Secondly, it could be argued that there is little to choose between food sovereignty and food security at the scale of the household—as with the FED paradigm of food security, food sovereignty is focused on “ensur[ing] equitable access to resources and obtain[ing] healthy, culturally appropriate and ecologically sustainable food for all” (Jarosz, 2014: 176). This thesis will argue that food security research across all scales would benefit from considering the local-level issues that are highlighted by the food sovereignty concept.

### *2.1.1: The causes of food insecurity*

This sub-section will show that food insecurity is the outcome of an interaction of multiple factors. It will discuss the causes of food insecurity and the future challenges that threaten to erode the advances made in the last 70 years.

Transient food insecurity (periodic or seasonal food insecurity) is more common than chronic food insecurity and is generally caused by shocks, such as a weather event like a drought, illness, conflict, or market price changes<sup>1</sup> (Smith, Obeid and Jensen, 2000). Longer-term factors including population growth, education levels and gender inequality contribute towards both forms of food insecurity (Smith, Obeid and Jensen, 2000). Maxwell and Frankenberger (1992) summarised some of the sources of risks to household food security (shown in Table 2.1, below). The extent to which populations are susceptible to each of these risk factors can be defined as their vulnerability and the extent to which they are able to mitigate these risks can be defined as their resilience (Wilson, 2018). These two concepts will be discussed in greater detail in Section 2.2 of this chapter.

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<sup>1</sup> Paarlberg (2000) suggests that world grain market conditions are not directly linked to food insecurity in poor countries, as these countries generally do not rely on grain imports.

Table 2.1: Sources of risk to household food security

Sources of entitlements	Types of risk				Market	Community	Other
	Natural	State					
Productive capital (land, machinery, tools, animals, trees, wells, etc.)	Drought contamination	Land or other asset redistribution/confiscation		Changes in costs of maintenance	Appropriation and loss of access to common property resources	Loss of land as a result of conflict	
	Land degradation Fire/Flooding						
Non-productive capital (jewellery, dwellings, granaries, some animals, cash savings)	Pests	Compulsory procurement		Price shocks (for example, falls in value of jewellery and livestock)	Breakdown of sharing mechanisms (for example, communal granaries)	Loss of assets as a result of war	
	Animal disease	Villageisation Wealth tax		Rapid inflation		Theft	
Human capital (labour, power, education, health)	Disease epidemics	Declining public health		Unemployment	Breakdown of labour reciprocity	Forced labour	
	Morbidity Mortality Disability	Restriction on labour migration		Falling real wages		Conscription Mobility restrictions Destruction of schools and clinics during war	
Income (crops, livestock, non-farm and non-agricultural activity)	Pests	Cessation of extension services, subsidies, price support schemes		Commodity price falls		Marketing channels disrupted by war	
	Drought and other climatic events	Tax increases		Food price shocks		Embargoes	
Claims (loans, gifts, social contracts, social security)		Reductions in nutrition programmes		Rises in interest rates	Loan recall	Communities disrupted/displaced by war	
				Changes in borrowing	Breakdown of reciprocity		

Source: Adapted from Maxwell and Frankenberger (1992)

In general, poverty, vulnerability and malnutrition are closely related (Maxwell and Frankenberger, 1992). For example, Smith, Obeid and Jensen (2000) found that poverty was the most widespread cause of food insecurity in 58 developing countries during the 1990s. It is possible for a community to experience only one of these three states, but being in one state increases the risk of the others. For example, malnutrition can cause poor health, which may reduce an individual's ability to work, thus increasing the likelihood of poverty and further malnutrition.

While improving resilience through technology and poverty reduction should have a positive effect on future vulnerability to food insecurity (Brown and Funk, 2008), factors such as population growth, nutritional transitions (Popkin, Lu and Zhai, 2002), unequal socio-economic development, healthcare and urbanisation (Loring and Gerlach, 2009), water security (Hanjra and Qureshi, 2010; Taylor *et al.*, 2013), market fluctuations (Cinner *et al.*, 2011), peak phosphorus (Cordell, Drangert and White, 2009), peak oil (Neff *et al.*, 2011), and land grabs (Nally, 2015) could erode any progress made.

In addition, biodiversity loss presents a major threat to food security. Current extinction rates are estimated to be one thousand times the natural background rate (Pimm *et al.*, 2014). Showing how these processes are often interlinked, much of this biodiversity loss has been caused by food production (Chappell and LaValle, 2011). Those who are most reliant on threatened flora and fauna tend to be the most vulnerable people (Béné, 2009).

Climate change – defined as large-scale, long-term changes in the mean and/or variability of the climate – is also likely to increase global food insecurity (Schmidhuber and Tubiello, 2007; Field *et al.*, 2014). Costello and colleagues (2009) state that by the end of the century “half of the world's population could face severe food shortages [as] rising temperatures take their toll on farmers' crops” (pg. 1703). Crop yields could be affected by flooding, droughts, sea-level rise and other climate shocks, either directly or indirectly through plant diseases and pest infestations (McMichael and Haines, 1997; Costello *et al.*, 2009). Seafood yields could be reduced as warmer ocean temperatures, extreme weather events, watercourse changes and ocean acidification impact upon aquatic populations (Brander, 2007; Branch *et al.*, 2013).

Climate change will, however, also have an impact on the access and utilisation dimensions of food security (Beddington *et al.*, 2012). Market, societal and governance weaknesses are likely to be exposed by climate shocks including flooding, heat waves and droughts (Schmidhuber and Tubiello 2007; Beddington *et al.*, 2012). Climate change could also increase food safety issues including food poisoning (Costello *et al.*, 2009). As previously noted, however, nearly 70 percent of all climate change and food security research has focused on food availability (Wheeler and von Braun, 2013).

The food security and climate change literature is a good example of research that risks being reductionist, elevating one factor to being the single most important factor determining food security (Hulme, 2011; Kelman, 2014). Official global narratives of climate change, most notably the IPCC process, have been slow to include the importance of the vulnerabilities that already exist within societies – such as poverty – before the impact of climate change (Bassett and Fogelman, 2013; Taylor, 2016). This is seen quite clearly in the 2001 IPCC report, which privileged the impact of environmental threats over all “non-climate forces and conditions”. This conception places all non-climate factors as being secondary in importance. Although climate change is undoubtedly a significant risk factor, it should be seen as a multiplier of existing risks (McMichael *et al.*, 2003; McMichael, 2013; Papworth, Maslin and Randalls, 2015). As Zeitoun *et al.*, (2016) note in reference to water security, reductionist approaches to complex problems can lead to effective policy responses being closed off and the reinforcement of existing inequalities.

This sub-section has shown there are multiple causes of food insecurity and that they interact with one another. It has also shown there is a paucity of research into the access and utilisation dimensions of food security at the local level. Understanding the level of complexity related to food security, particularly in the face of multiple new challenges, requires comprehensive approaches to research that can give a deep understanding of all local-level issues and account for all potential determinants of food security (Dedehouanou and McPeak, 2018; Smith and Frankenberger, 2018). Documenting the potential causes of food security for the Rama and understanding the nuances of how they interact will be one of the main points of focus for this thesis. The following sub-section will argue that there is no ‘gold standard’ measure of food security.

### *2.1.2: Measuring food security*

Measuring food security is difficult and there is no consensus on how it should be done (Maxwell and Frankenberger, 1992; Barrett, 2010). Maxwell and colleagues (1999) have claimed that food security is probably too complex to ever be captured by a single indicator, but a number of methods have been developed using food production, food expenditure, calorie consumption and the nutritional status of individuals (Riely *et al.*, 1999). These indicators can be separated into process and outcome indicators.

#### *2.1.2.1: Process indicators*

There are two types of process indicators: those on the supply side and those on the access side. Supply side indicators include agricultural production, pest infestations and food balance sheets that record national- and regional-level data such as surpluses and import requirements (Maxwell and Frankberger, 1992). These indicators are focused largely on the availability dimension of food security, although some information on the access dimension may be captured. These measures are also problematic because it is less possible to disaggregate data by specific regions or populations (Maxwell and Frankenberger, 1992).

The most prevalent process indicator on the access side is the analysis of coping strategies<sup>2</sup>. Corbett (1988) reviewed the different stages of coping strategies outlined by other research. This showed that researchers had argued coping strategies could be classified into between three and 10 stages of severity. Following Corbett (1988), these have been summarised into four stages in Table 2.2 (below).

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<sup>2</sup> Coping strategy is preferred over coping response as the latter has generally been posited as the term for the individual actions that are taken as part of a planned strategy (Corbett, 1988).

Table 2.2: Stages of coping strategies

Stage	Coping strategies
1	Reduction in the variety or quality of foods Increased consumption of wild foods Reduction in the number of meals per day Changes in planting/cropping practices
2	Transfer of food between households Use of loans and credit Search for employment/individual migration
3	Sale of assets (land, tools, livestock)
4	Out-migration of entire households Reliance on charity

Source: Adapted from Corbett (1988)

It is presumed with this measure that a household will migrate from the first stage onto the second stage only if the strategies in the first stage were not sufficient to ensure food security. A household's food security could therefore be measured based on the severity of the coping strategy they are currently using—a technique that has been extensively tested by Maxwell and colleagues (Maxwell *et al.*, 1999; Maxwell, Caldwell and Langworthy, 2008).

The presumption that households move through coping strategy stages in a neat process has been challenged, however, because it treats food insecurity as consisting as a series of bounded events, when they are often complex and overlapping (Corbett, 1988). It also ignores the social, cultural and political context in which they occur and the way households construct their livelihoods over time (Hendriks, 2015). For example, some households may choose to go hungry in order to not have to dispose of productive assets (de Waal, 1989). Equally, the original paper by Corbett (1988) clearly showed there was considerable difference of opinion about what coping strategies should go into which stages. For example, some authors separated the sale of livestock from the sale of other assets. Research has also shown these coping strategies can become part of the fabric of livelihood strategies (see Section 2.3 of this chapter) and are thus this measure is unable to pick up on transient food security (Maxwell, 1996).

### 2.1.2.2: Outcome indicators

Food security indicators focused on outcomes can be either direct or indirect. Direct outcome indicators include food frequency assessments, household perception or experience of food insecurity<sup>3</sup>, and household budget and consumption surveys (which tend to collect data on calories) (Maxwell and Frankenberger, 1992). All of these are less able to account for differences in the quality of food—for example, nutritional outcomes can be very different between two people who consume the same amount of calories. They are also based on personal assessment or recall and this can be problematic due to reliance on memories or if respondents “perceive some benefit to actually manipulating information, such as in under-reporting their incomes in the hopes of qualifying for a feeding program” (Riely *et al.*, 1999: 39). Household budget surveys are less appropriate for people living partly or entirely off the land (Russell *et al.*, 2018).

Indirect outcome indicators to determine food security include using anthropometric measurements such as the weight of individuals and levels of stunting. There are three problems with this indicator, as noted by Maxwell and Frankenberger (1992). Firstly, there is a time lag between food insecurity and measurable impacts. Secondly, the most destitute people tend to leave the distressed region, which distorts the sample. Thirdly, health, physiology and physical activity levels can also influence these measures.

A general criticism of all the indicators highlighted above (with the exception of household perception and experience indicators) is that they don't capture information on the utilisation dimension of food security. All of the indicators may also miss the stability dimension as well if not repeated regularly. There is also no consensus on which is best to use, thus supporting the argument that there is no 'gold standard' measure of food security.

A larger suite of information about communities' livelihood strategies and longer-term sustainability is captured by methods like the Integrated Food Security Classification and Emergency Food Security Assessments (EFSAs). The latter of these two seek to understand the types and amount of food eaten by the target population, the likely underlying causes of food security, and to describe the strategies and livelihoods of

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<sup>3</sup> An example of indicators like this is the Food Insecurity Experience Scale (FIES) (Smith, Rabbitt and Coleman-Jensen, 2017)

different groups in order to build a comprehensive understanding of the communities' vulnerability and resilience to food insecurity (WFP, 2009). As the intention of this thesis is to conduct a fine-grained study of food security within small communities, measuring food security using an EFSA would be appropriate. As they are generally designed to rapidly assess larger regions, however, this thesis will adapt an EFSA called the Household Economy Analysis (HEA) so it can be used to capture more detailed, household-level data.

The concepts of vulnerability and resilience have been mentioned throughout this section, as they are critical to a full understanding of the threats to food security and the responses to food insecurity. The following section will define these terms and highlight important constructive tensions in their use.

## **2.2: Vulnerability, resilience and adaptive capacity**

New threats to food security outlined in the previous section, particularly climate change, have reinvigorated the debate on vulnerability and resilience within the academic literature. Indeed resilience has become as much of a buzzword within food security circles as it has done in the rest of the academic literature (Tendall *et al.*, 2015; Mochizuki *et al.*, 2018). For example, the 2017 FAO, IFAD, UNICEF, WFP and WHO joint report on global food security was subtitled, "Building Resilience for Peace and Food Security" (FAO, IFAD, UNICEF, WFP and WHO 2017). This section will argue that research into small communities such as the one studied for this project are critical for ensuring that resilience theory is able to account for heterogeneity in food systems.

Some scholars in the social sciences argue that vulnerability and resilience are not opposites, stating that communities can be resilient even if they are vulnerable. Cutter (2016) gives the example of the Vietnamese community in New Orleans East that was socially vulnerable before Hurricane Katrina because the residents had low income and were non-English speaking, but they were still able to rapidly rebuild (be resilient) afterwards because of their high social capital. Others contest this and state that resilience is a normative concept and posit that vulnerability and resilience are rough antonyms that exist on a scale (see Figure 2.1, below) (Adger, 2000; Barnett, Lambert and Fry, 2008; Mochizuki *et al.*, 2018; Wilson, 2018). It will be argued in this thesis,



that the second of these positions is correct: if a community is more vulnerable to food insecurity, it means they are less resilient to the causes of food insecurity. In the example given by Cutter (2016), the Vietnamese community was vulnerable before the Hurricane, but less vulnerable than other communities that didn't have its high social capital—a factor of its resilience. Vulnerability will be discussed first in the following sub-section, followed by resilience.

**Figure 2.1: Resilience and vulnerability as rough antonyms**



Source: Author

### 2.2.1: Vulnerability

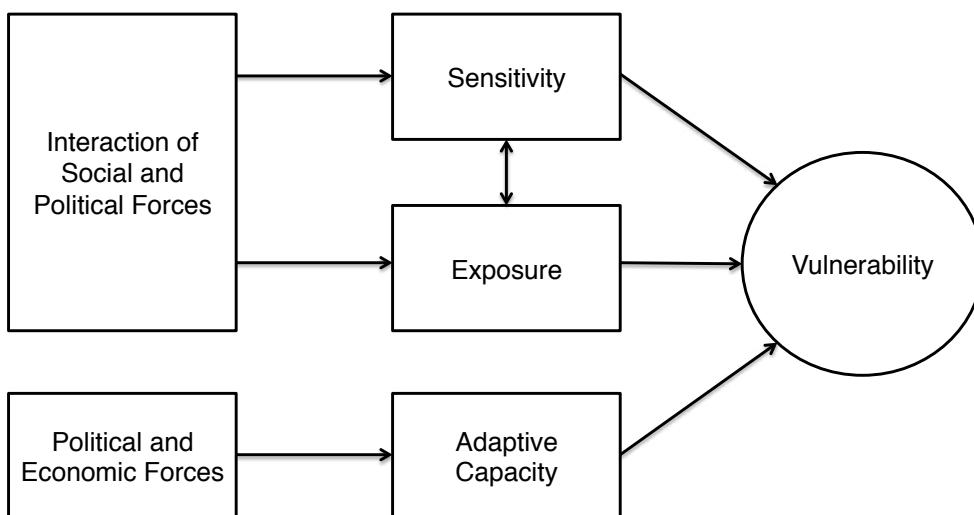
Vulnerability is used in many disciplines, but due to the resulting multiple interpretations and uses, it is a contested concept. This can be a particular hindrance in multi-disciplinary research projects (Gallopín, 2006). This section of the chapter will first discuss vulnerability and then link in to a definition of resilience and a discussion of resilience theory through a discussion of social vulnerability.

Within the disciplines of ecology, disaster management and hazards, vulnerability can be defined as “the degree to which a system is likely to experience harm due to exposure to a hazard” (Turner *et al.*, 2003: 8074). The food security community, however, with its focus on availability, access, utilisation and stability, generally defines vulnerability as the susceptibility to harm from exposure to stresses associated with environmental and social change, and the absence of capacity to adapt (Adger, 2006; Smit and Wandel, 2006). This divide has its roots in the debates of the 1970s/1980s between the hazards literature, that tended to ignore human agency in responses to environmental hazards, and the political ecology literature, that sought to highlight individuals and the political-economic dynamics and societal constraints that are acting on them (Burton, Kates and White, 1978; Watts, 1983).

Biophysical vulnerability is defined as a direct function of hazard, exposure, and sensitivity and is similar to the concept of risk in the natural hazards literature (Brooks,

2003). Social vulnerability in contrast is used to describe all the factors that determine “the outcome of a hazard event of a given nature and severity” (Brooks, 2003: 5). The key difference between these two concepts can be summarised by stating that biophysical vulnerability includes characteristics of the hazard, whereas social vulnerability does not (Füssel, 2007). Biophysical vulnerability sees vulnerability in terms of a human system being susceptible or unable to cope with a hazard and the extent of damage caused being mainly due to the magnitude of that hazard (Brooks, 2003). In contrast, social vulnerability sees vulnerability as existing within the human system itself, independent of external threats (Brooks, 2003; Houghton *et al.*, 2001). Both of these types view the human and natural realms as separate. The distinction between these two types of vulnerability can be outlined through discussing Figure 2.2 (below) that posits vulnerability as the endpoint of a system’s sensitivity, exposure and adaptive capacity.

**Figure 2.2: Contributions to the concept of vulnerability**



Source: Adapted from Smit and Wandel (2006)

This division between biophysical and social vulnerability comes, in part, from different views of exposure and sensitivity. Whereas biophysical vulnerability defines exposure as external to the system, social vulnerability defines exposure as the degree to which the system is in contact with a threat (Gallopín 2006). Whereas biophysical vulnerability views sensitivity as the degree to which a system is affected or modified by a threat (Gallopín 2006), social vulnerability defines sensitivity as the ability of a system to absorb suffering without long-term harm (Adger and Vincent, 2005).

The social vulnerability framework recognises vulnerability can exist within a human system itself and can be addressed even in the absence of present threats. A social vulnerability (or starting point) approach is therefore appropriate to capture the characteristics of the system (the Rama community) in relation to all four dimensions of food security. The entitlement approach within the food security literature may, in turn, underplay ‘external’, environmental pressures, but studies are increasingly integrating social vulnerability with environmental change through the political ecology literature (Taylor, 2016).

### 2.2.2: Resilience

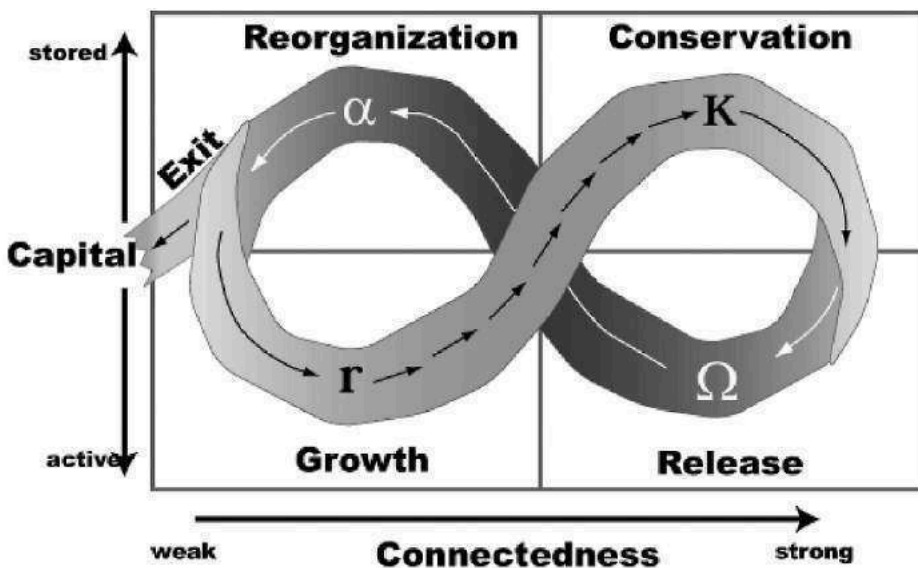
Scholarly interest in resilience has increased greatly over the last four decades and is difficult to define accurately because of its multiple uses across many disciplines (Welsh, 2014; Mochizuki *et al.*, 2018). It is considered to be a concept of importance in many disciplines including psychology (Luthar, Cicchetti and Becker, 2000), public health (Windle, 2011; Herrman *et al.*, 2011), security (Walker and Cooper, 2011; MacKinnon and Derickson, 2013), and business studies and economics (Hamel and Välikangas, 2003). In relation to food security, it is a useful concept to explain how livelihood strategies (discussed in Section 2.3 of this chapter) can change in the face of threats. This section of the literature review will briefly outline the development of the resilience framework and describe its implications and weaknesses.

Resilience as a framework for food security research has its roots in the work of Holling (1973). Holling’s 1973 paper challenged the accepted ecology-based definition of resilience as concerning how fast an ecosystem is able to return to an equilibrium following a perturbation by opposing the idea that there is a point to which ecosystems naturally return after shocks (Pimm, 1984; Walker and Cooper, 2011). Instead he argued that the natural state of an ecosystem was change and therefore when it was faced with a perturbation, the exact state to which it returned was less important than whether or not the relationships within that system remained (Holling, 1973). Holling’s resilience concept – dubbed ‘ecological resilience’ as opposed to ‘engineering resilience’ – can be defined as: “the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks” (Walker *et al.*, 2004: 2). The previous emphasis on

eliminating all system vulnerabilities is thus replaced with the challenge of maintaining the ability of the system to respond when disturbed (Nelson, Adger and Brown, 2007).

Holling (1973) introduced the adaptive cycle model to explain the development of ecosystems (see Figure 2.3, below). This model states that systems go through a growth stage ( $r$ ) and that resources become increasingly expended during the following conservation stage ( $K$ ), so the entire system becomes less flexible and biodiversity – analogous to wealth in social systems – is reduced (Walker and Cooper, 2011). This is inevitably followed by a period of release or collapse ( $\Omega$ ) and reorganisation ( $\alpha$ ) (Carpenter *et al.*, 2001). These latter two stages are likely to be a time of creative destruction (Carpenter *et al.*, 2001), when “innovation and new opportunities are available”, leading to more growth (Walker and Cooper, 2011: 2). This innovation and subsequent round of growth may enable the system to move into a new ‘basin of attraction’.

**Figure 2.3: The adaptive cycle of resilience**

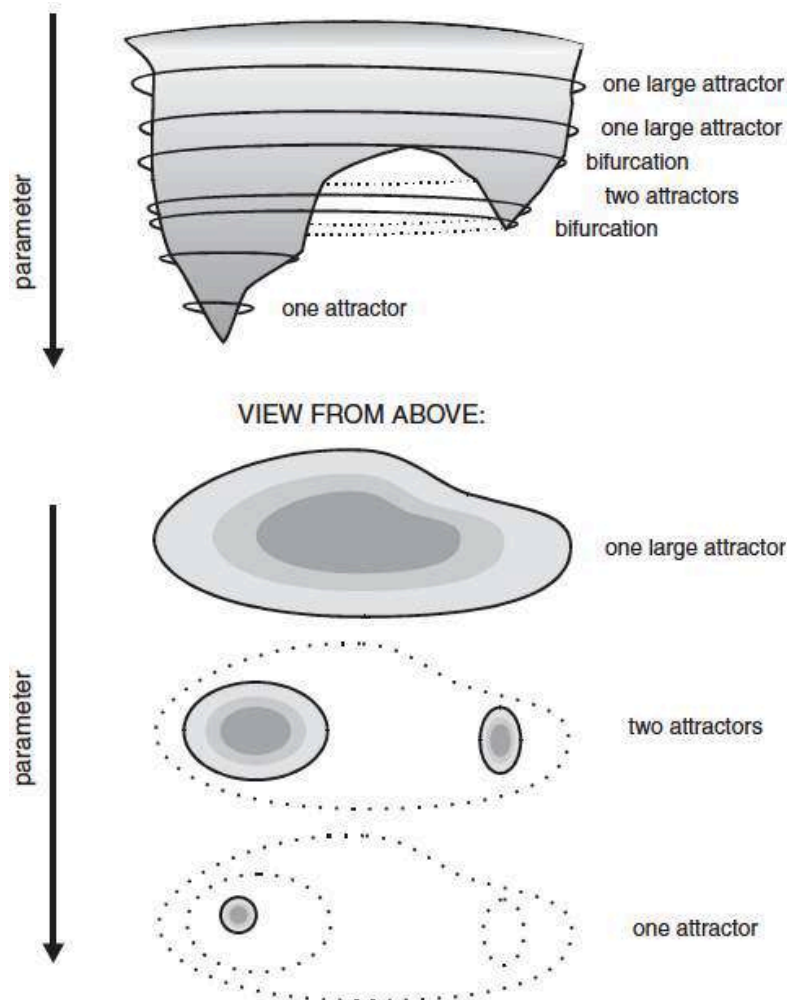


Source: Walker and Cooper (2011)

The idea of basins of attraction is central to the resilience framework (Gallopín, 2006), and are visualised in Figure 2.4 (below). Holling’s conception of resilience allowed for ecosystems taking multiple possible paths. This spawned the idea that these paths represented multiple ‘basins of attraction’ in which ecosystems could reside (Folke, 2006). Each system has one or more possible ‘attractors’ and when the system remains in the same trajectory towards one of these, it is in a single basin of attraction (Gallopín,

2006). Ecological resilience is therefore not the measure of constancy of the actual system's make-up, but its ability to remain within a single basin of attraction through the preservation of its behaviour and relationships (Gallopín, 2006).

**Figure 2.4: Visualisation of the basins of attraction concept**



Source: Gallopín (2006)

In the context of socio-ecological systems (SESs)<sup>4</sup>, a move into an alternative basin of attraction could include a new method of income generation once a previous way of earning a living has become untenable. An example would be cattle farmers in Zimbabwe in the 1980s that after devastating drought shifted to an economy based on ecotourism (Walker *et al.*, 2004).

<sup>4</sup> Socio-ecological systems are defined as “the subset of social systems in which some of the interdependent relationships among humans are mediated through interacting biophysical and non human biological units” (Anderies, Janssen and Ostrom, 2004: 5).

As can be seen from this example, Holling's concept has been adopted into other disciplines. While the concept of ecological resilience should not be transferred uncritically to the social sciences because there are fundamental differences in behaviour between social systems and ecological systems (Adger, 2000; Cote and Nightingale, 2012), its use as a theoretical basis for food security studies is well established (Tendall *et al.*, 2015). Adger's (2000) seminal paper helped bring resilience into the social sciences. In it, he defined social resilience as "the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change" (pg. 247).

In the social sciences, the difference between specified and general resilience is very important. Specified resilience refers to resilience to a specific thing and if this is pursued by a society, it is likely that society will become less resilient to unusual events (Folke *et al.*, 2010). In contrast, general resilience describes being resilient to everything, placing the focus on having the flexibility to cope with uncertainty (Folke *et al.*, 2010). It is therefore very important that policymakers consider what resilience actions aim to address and for whom. Not doing so means the failures of existing power structures will not be addressed and may perpetuate the vulnerability of certain communities (Cutter, 2016).

Tendall and colleagues (2015) argue that when resilience is applied to food systems, resilience refers to general resilience, so it is "not limited to the capacity of the system to cope with a specific driver of change" (pg. 19). Food system resilience can then be defined as "the capacity over time of a food system and its units at multiple levels, to provide sufficient, appropriate and accessible food to all, in the face of even unforeseen disturbances" (Tendall *et al.*, 2015: 19). The influence of the Food Entitlement Decline (FED) conception of food security is clear in this definition with the emphasis on ensuring appropriate and accessible food at all times.

It is important, however, to note the scale of this definition—it is applied to food systems rather than communities or households (which is the focus of this research). This is one of the ways in which resilience theory can obscure the importance of considering for whom resilience should be prioritised. The following section will outline some of the criticisms of resilience theory in order to determine important areas of enquiry for this thesis.

### *2.2.3: Criticisms of resilience theory*

Many scholars have criticised resilience because maintaining relationships and trajectories can be unsatisfactory or harmful (Yamane, 2009; Pelling, 2011). The best outcome for a specific system as a whole might be to allow some groups to become or remain vulnerable, either at a different scale, in a different place, or at a different time. In the literature there is very little analysis of the heterogeneity of resilience and an assumption that there is a ‘desired state’ that should be pursued (Brown, 2014). For example, the capitalist system can be considered resilient even though this resilience comes at the expense of the development and wellbeing of particular social groups and regions (MacKinnon and Derickson, 2013). Equally, the fossil fuel industry has been remarkably resilient to perturbations, but fossil fuel use is harmful to the planet in the long term (Phelan, Henderson-Sellers and Taplin, 2013). These are examples of perverse resilience, which are defined as “resilience specific to one internal dimension of the overall system that is at odds with the sustainability of the system” (Phelan, Henderson-Sellers and Taplin, 2013: 199).

This sub-section will discuss the different ways that some groups of people could be disadvantaged by a resilience focus. It will indicate important points of enquiry that will be addressed in the empirical chapters of this thesis.

Firstly, resilience’s focus on maintaining current trajectories and the ability to respond to change means eliminating existing vulnerabilities may not be a priority. MacKinnon and Derickson (2012: 254) argue that resilience is too conservative privileging “established social structures, which are often shaped by unequal power relations and injustice”. This is because resilience depends largely on the ultimate aspiration of the groups or individuals who makes these decisions, which are usually those with power. Chandler (2012) argues that resilience can therefore be seen as a move towards empowering vulnerable individuals by shifting the focus towards individual agency. Most scholars, however, argue that this means the resilience framework could close off more progressive social change; the best way to be resilient might be to prevent resistance towards established power structures (MacKinnon and Derickson, 2012; Welsh 2014). The resilience discourse is thus tied into present neoliberal trajectories, which have been shown to be disadvantageous for vulnerable groups such as indigenous peoples (Joseph, 2013; Welsh, 2014). The following section of this chapter (Section

2.3) will discuss the concept of transformational adaptation that seeks to challenge vulnerabilities caused by these trajectories. This will point to further potential areas of enquiry for this project.

Secondly, resilience theory may obscure the importance of scale. Most food system studies based in resilience theory do not tend to account for “cross-scale and cross-level interactions” (Tendall *et al.*, 2015: 18). There is a difference between idiosyncratic (household level-) and covariate (community level-) food security (Coomes *et al.*, 2010) and when multiple factors interact, each will have different tipping points and operate across different temporal and spatial scales (Misselhorn *et al.*, 2010). Resilience at one scale depends on the processes at the scales both above and below it (Mochizuki *et al.*, 2018). For example, the resilience of a community can be affected by both decisions made at the household level and through local politics, national market shifts and global climate change (Pelling, 2011; Taylor, 2016; Mochizuki *et al.*, 2018). Deliberate change at a large scale is likely to be too costly, socially unacceptable and/or contribute towards further inequality (Folke *et al.*, 2010). Eakin and Wehbe (2009) argue that transforming at the smallest scale possible is therefore likely to be more successful and less damaging. They state – based on case studies with Latin American farmers – that individual actions can have important and disproportionate consequences on the larger scale social-environmental system in which the individual lives.

Thirdly, actions to boost resilience in one location may harm a community in another. For example, Nielsen and Reenberg (2010) show that the Fulbe in Burkina Faso were excluded from projects because of their “cultural commitment” to living on the outskirts of villages (Cote and Nightingale, 2012). Finally, resilience does not necessarily have to be sustainable, because it can be increased in the present at the expense of future resilience (Carpenter *et al.*, 2001).

It is important, therefore, that the scales, spaces and times at which vulnerability and resilience might occur for the Rama are considered (Tendall *et al.*, 2015). To do this, it will be necessary to have a holistic, fine-grained understanding of the Rama’s food security and the ways in which threats to food security and responses to food insecurity manifest at the household level.



Another criticism of resilience theory is that when it is defined as the ability to bounce back from perturbations it does not take into account anticipatory responses like proactive adaptation. Adaptation generally can be seen as the manifestation of adaptive capacity, and adaptive capacity can be seen as being synonymous with resilience (Carpenter *et al.*, 2001; Smit and Wandel, 2006; Nelson, Adger and Brown, 2007; Pelling, 2011). This was seen in the assumption of Figure 2.2, where adaptive capacity was viewed as a determinant of vulnerability and therefore if a human system's adaptive capacity is higher, the human system's vulnerability to threats will be lower (Brooks, Adger and Kelly, 2005). Studies of food security based in resilience theory therefore need to consider how communities respond (adapt) to food insecurity and this will be discussed in the following section.

### **2.3: Responding to food security threats**

This section will critically analyse the literature on responses to food security threats. It will discuss the concept of coping and it will also discuss livelihood strategies, which are connected to this concept and will be a focal point throughout the thesis. It will then discuss adaptation (which some disciplines view as encompassing coping) drawing largely on the climate change adaptation literature. The thesis will argue that it is important for policymakers and stakeholders to have a fine-grained understanding of how communities respond to food security before enacting adaptation strategies because of the risk of increasing inequality.

#### *2.3.1: Coping*

Coping strategies have been discussed in sub-section 2.1.2 of this chapter (above), and were briefly outlined in Table 2.2. They include reducing the variety or quality of foods eaten, limiting portions, increasing consumption of wild foods, borrowing food or money for food, purchasing food on credit, selling assets and permanent out-migration.

The measurement of food security based on coping strategies suggests that livelihood diversity is a stress response to food insecurity. Bernstein, Crow and Johnson (1992) similarly classify livelihood diversification, such as farmers taking up non-agricultural

employment, as being a last resort measure. Scoones (1998) suggests that households diversify their livelihoods to accumulate assets, which they then progressively liquidate. Households favour activities that reduce short-term risk. For example, they would prefer to choose an activity from which they receive a higher output now, even if it meant the overall output of a different activity was higher in the longer term (Banerjee and Duflo, 2011). Research has shown, however, that households also diversify their livelihoods out of choice to boost income as well as reduce risk (Davies, 1996; Ellis, 2000).

### 2.3.2: *Adaptation*

For many families, using coping strategies such as diversifying livelihoods is a reactive response to threats as they occur. Some households, however, take proactive steps to reduce their vulnerability. These might be termed adaptations (as opposed to coping strategies), but it is important to note that there are frequent differences in terminology in the literature.

Generally, the literature asserts that adaptations can be reactive or anticipatory, spontaneous or planned, and autonomous or institutionally implemented (Stakhiv, 1993; Adger and Kelly, 1999; Smit *et al.*, 1999). This last binary distinction is dependent on the scale at which adaptations take place, with adaptation possible at all scales from the individual to the global (Taylor, 2016)—as touched upon in the work of Eakin and Wehbe (2009). These conceptions of adaptation mean that the coping strategies and the diversification of livelihoods mentioned in the previous two sub-sections could also be classified as adaptations.

There is also a debate about whether adaptation is a process rather than a status or outcome (Nelson, Adger and Brown, 2007; Tompkins *et al.*, 2010; Pelling, 2011). This thesis views adaptation as a process, with its goal being to maintain food security through either short-term strategies or long-term approaches that boost overall wellbeing (Adger *et al.*, 2009). The remainder of this sub-section is based in the climate change adaptation literature as it provides a useful basis for discussing this concept.

The climate change adaptation literature has been previously criticised for being climate reductionist<sup>5</sup> and is undergoing a shift in emphasis towards a social vulnerability approach (Hulme, 2011; Pelling, 2011). This is similar in some respects to the shift in the food security literature away from the availability paradigm (FAD) towards the entitlements paradigm (FED). Although he does not explicitly state so, Pelling's (2011) work on climate change adaptation is based within the resilience framework of climate change adaptation.

Pelling (2011) classifies adaptation into three pathways: resilience, transitional and transformational. Resilience adaptation is seen as the maintenance of "functional persistence" (Pelling, 2011), and the concept appears analogous to 'coping' (as in subsection 2.4.1) (Mcgray *et al.*, 2007). This form of adaptation is designed to allow the community for which it is devised to continue functioning in the face of new threats, but it may allow unsustainable, or socially unjust practices to persist. It can be seen as the maintenance of the status quo and, in some circumstances, as the result of previous rounds of adaptation.

Transitional adaptation, an incremental or intermediary form of adaptation, is defined by Pelling (2011) as being where individuals or communities attempt to exercise the rights to which they are already entitled under existing political and governance regimes. The literature dedicated to this adaptation pathway is focused on technological approaches to address specific vulnerabilities (Bassett and Fogelman, 2013). Examples relevant to food insecurity include introducing new seed varieties with higher yields or improving irrigation systems to improve agricultural output during drought or flooding events (Tanner and Mitchell, 2009), and exploiting groundwater reserves and desalinisation technology to cope with water shortages (McEvoy and Wilder, 2012). As noted, the resilience framework generally has been criticised for being too conservative and potentially closing off more progressive social change. The transitional pathway of adaptation has been similarly criticised for its focus on a limited number of possible

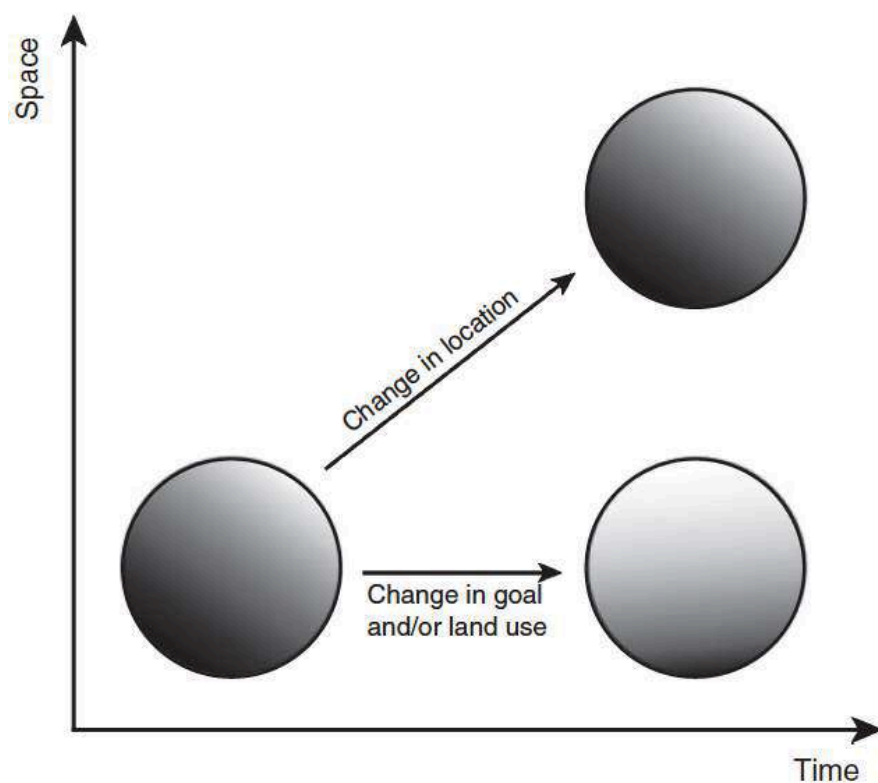
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<sup>5</sup> The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as "The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities" (Agard *et al.*, 2014: 1). This definition has been criticised for marginalising socio-economic causes of vulnerability (Bassett and Fogelman, 2013).

responses to climate threats and for not focusing on addressing underlying social inequalities (Brown, 2014).

Some scholars have given the label of transformational adaptation to longer-term adaptation. The Stern review (2006) defines transformational adaptation as ‘major, non-marginal change’. Rickards and Howden (2012: 240) define it as “major, purposeful action undertaken at the farm or supra-farm level in response to potential or actual climate change impacts and opportunities in the context of other drivers”. The authors outline two different forms of this type of adaptation: a major change in location or a major change in farm goal or land use (as shown in Figure 2.5 below).

**Figure 2.5: The two main forms of transformational adaptation in agriculture: A change in goal, or a change in location**



Source: Rickards and Howden (2012)

They argue that the increase in diversification of income streams by Australian farmers should be seen as transformational adaptation. Pelling (2011) would still classify these examples as transitional adaptation. While these changes would be significant for the systems involved, in the context of multiple social and economic forces acting on these agricultural systems alongside climate change, these responses are unlikely to address

the inherent inequalities contributing to their vulnerability in the first place. For example, the option to move farms or alter its production focus may not be available to the poorest communities that are the most likely to be threatened by climate change (Tanner and Mitchell, 2009). This is because these individuals either lack sufficient capital (be that human, social or economic) or because they are unlikely to be part of this farm-level decision process if, for example, they are landless labourers.

In contrast, Pelling (2011) defines transformational adaptation as a form of adaptation that not only defends present social gains, but also provides scope to overturn, revise or reform existing social contracts. Rather than the exercising of existing rights, transformational adaptation involves new rights being claimed, seeking to tackle the causes of vulnerability itself. This might mean challenging the unsustainable or socially unjust practices that may currently exist through challenging or addressing their root causes, rather than their symptoms. This focus on progressive social change addresses MacKinnon and Derickson's (2012) criticism of the resilience framework.

Using the example of agricultural adaptation in Rickards and Howden (2012) shows how the focus of Pelling's transformational adaptation is on the outcome rather than the actions taken. In some instances new rights may be being claimed when moving farms or changing farming practices, but doing so may not necessarily address existing inequalities or systems that are responsible for creating vulnerability such as inequality in land access or credit. The outcome of the adaptation is thus the most important factor in determining whether an adaptation is transformational or not, rather than the extent of the actions taken. Transformational adaptation needs to address the overall causes of vulnerability without increasing harm for another population or the same population at a different time.

When it does not do this, it may be considered to be maladaptation, which describes adaptation actions that cause unintended consequences that could be both spatially and temporally disparate from where the adaptation took place (Pelling 2011). It is a similar concept to the idea of perverse resilience. For example, a study by Eriksen and Lind (2009) found that an adaptation project in Kenya caused existing power structures and inequalities to be strengthened because the schemes introduced did not include local people in their planning and execution. Examples of maladaptation within the climate change adaptation literature include adaptation that increases greenhouse gases

emissions, reduces further incentives to adapt to climate change, creates path dependency, or has high opportunity costs (Barnett and O'Neill, 2010). Brown (2014) states that in order to reduce the likelihood of maladaptation, it is important to ensure potential positive and negative consequences are fully understood before any action is taken. The author notes that policymakers should be aware vulnerability is created through multiple stressors and action should be taken in partnership with multiple stakeholders and be sensitive to change. As with perverse resilience, averting maladaptation thus requires a full understanding of existing inequalities and their causes. This can only be achieved in the context of the Rama communities by seeking to gain a fine-grained understanding of their food security.

Because adaptation has the potential to be disruptive there is a risk it could create greater vulnerability due to societal instability and exacerbation of inequalities (Tol, Fankhauser and Smith, 1998; O'Brien, 2012). Bassett and Fogelman (2013: 52) highlight that representation and accountability are important reforms for transformational adaptation, but they ask whether these reforms necessarily always result in "greater equity and less environmental degradation". An example of when action to reduce environmental degradation increased social inequality comes from a study by Berrang-Ford and colleagues (2012). The authors explained that the Batwa Pygmies in Uganda were removed from their traditional lands by the government in order to create a nature reserve and found that the indigenous group felt their health had declined because they no longer had access to their traditional foods and medicines.

Another challenge comes from the long timescales of important threats to food security such as climate change, biodiversity loss or land rights issues. It may be unclear whether maladaptation has occurred until long after the adaptation took place. For this reason, this project will ask respondents about past adaptations.

Equally, from a practical point-of-view, the person judging the outcome will determine the success of adaptation. A government policymaker could judge an adaptation to be successful even if a local person does not. This could enhance social inequalities if the adaptation is directed, designed and determined by those in powerful positions. Without a clear way to judge the outcome of adaptation, the concept may be unable to achieve its goal of lasting social change. This is particularly true of transformational adaptations because these are likely to challenge existing power structures and so those who wield

power will resist it. Pelling (2011) argues that existing structures that exploit vulnerable communities may be so ubiquitous they become naturalised. Moreover, as a result of globalisation, the dismantling of these forces may be beyond the scope of local or national action. In some cases even the consideration of challenging the status quo may call for a wholesale questioning of the embedded cultural values, beliefs and loyalties that exist in that community (O'Brien 2012). Adger and colleagues (2009) argue there are real – but subjective – limits to adaptation because the connections between people and their homes and culture may have to be broken in order for it to be successful. Understanding the linkages between these concepts will be vital for this project.

Pelling's (2011) account pays relatively little attention to the cultural complexity of human relationships with climate and food. This stems largely from the fact that Pelling's (2011) work has focused on adaptation at the institutional level and the examples he provides are all focused on the national or institutional level. This criticism can also be levelled at other research, including Taylor's (2015), which has sought to refocus attention onto the structural causes of vulnerability from within a political economy perspective. Institutions in this context are defined as both formal organisations and the "behaviour and rules and norms that govern society" (Adger 2000: 348). Indeed many scholars continue to base the solutions to applying resilience theory to human systems on "getting the rules right" at the level of institutions (Cote and Nightingale 2012: 480).

This is problematic for two reasons. Firstly, the behaviour, rules and norms that govern society change over time. Secondly, it may mean that the research being conducted at this scale is ignoring household-specific actions, which can have a disproportionate impact on the wider system in which that household resides (Eakin and Webbe, 2009). It is important for "...analyses of the capacity to adapt to change [to] be framed within an understanding of cultural values, historical context and ethical standpoints of the kinds of actors involved." (Cote and Nightingale 2012: 48). This again highlights the importance of conducting a fine-grained investigation of the Rama's food security. The following section will highlight these context-specific elements that are likely to be critical for the Rama's food security.

## **2.4: Food security at the community level**

The first sub-section of this section will critically analyse the definitions of indigenous peoples. It will argue that a global definition is largely inappropriate due to the vast diversity of indigenous groups around the world and comment on important issues that arise that will be discussed in the remainder of this section. The second sub-section will discuss the importance of land to the Rama's identity and briefly outline the current regional disputes. The following two sub-sections are on culture and food, and culture, climate and food. They will argue that having an understanding of the Rama's culture is vital to determine the utilisation dimension of their food security. It will show how the perception of food items and the weather can impact upon vulnerability, resilience and decision making. The fourth sub-section discusses how vulnerability and resilience can be affected by the way in which food is shared within a community. The fifth sub-section discusses market integration including how it can be measured and the impact that it can have on food security.

### *2.4.1: Indigenous peoples*

Based on a national survey (for which the definition of indigenous used is not forthcoming), Nicaragua is claimed to have 566,500 indigenous people, representing around 10 percent of the national population (IWGIA, 2017). The Rama population is estimated to be about 1,500 people (GTR-K, 2007), representing less than 0.03% of the national population.

It is very difficult to define what makes a person indigenous. There is an enormous variation in indigenous groups globally, with around 5,000 distinct indigenous cultures accounting for most of the world's cultural diversity (Sadiq, 2017). This makes any single, global definition largely inappropriate. Each individual indigenous group has its own characteristics and relationship to the local environment and the state in which it lives. As argued by Sarivaara, Maatta and Uusiautti (2013), the concept of indigenous people is created largely for international agreements. This section will therefore review the most frequently cited definitions and comment generally on their contents rather than discerning which is the most appropriate.



There are cultural, historical, political and geographical bounds in most definitions of indigenous peoples (Corntassel, 2003). In the context of the American continent a straightforward distinction can generally be made whereby indigenous peoples are those who inhabited the land before European settlers (Stephens *et al.*, 2006). These peoples have survived European invasion and now coexist with, and compete for resources against, the mainstream society in the state in which they now live. They may be defined as those that are “systematically marginalised by the state” (Stabinsky and Brush, 1996; Stephens *et al.*, 2005). This is certainly the case for the Rama as they make-up only 0.03% of the entire Nicaraguan population. If the Rama were no longer marginalised by the state, however, they would still be indigenous. In Bolivia and Guatemala, “indigenous peoples” make-up more than 50% of the national population and although this does not mean they are not marginalised by the state, it does point to the problems of defining indigenous groups relative to their position within the state in which they live (as well as the error of producing a global definition).

The report into the discrimination of indigenous peoples by the UN’s special reporter, José Martínez Cobo, distinguished between group-level definitions and individual-level definitions (Martínez Cobo, 1981). At the group level, indigenous peoples are those that have a different identity and culture from the national society, do not have political representation at a national level, may be linguistically distinct from the national society and base their livelihoods on local resources (Stephens *et al.*, 2006). The danger of definitions such as these is that they portray indigenous peoples as being either primitive groups inferior to mainstream society, and/or romanticise their traditional lifestyles as being “untouched by modernity, with uniquely different cultural patterns and conceptual worldviews that challenge current conventional truths” (Stephens *et al.*, 2006: 2020). At the individual level, indigenous identity can be constructed from self-identification and/or recognition and acceptance by other indigenous peoples (Stephens *et al.*, 2006). This ensures the populations themselves reserve the right to decide who belongs to them without outside interference (Sarivaara *et al.*, 2013).

Finally, it is important to note that the right to occupy, manage and exploit their own land and its resources is a fundamental part of indigenous identity. The New Zealand Maori prefer the term *Tangata Whenua* (people of the land) (Cunningham and Stanley, 2003). Additionally, Te Ahukaramu Charles Royal states that whereas the Western worldview views God as external and the Eastern worldview focuses on reaching within

the soul, Indigenous communities view themselves as having a “seamless relationship with nature” (Cunningham and Stanley, 2003: 403).

The importance of the land to the Rama was highlighted by Riverstone (2004), during his fieldwork between 1999 and 2001, when he showed the Rama have traditionally considered that without land they are ‘no longer true Rama’. The following section will discuss land issues in the context of the Rama territory.

#### *2.4.2: Land*

The introduction to this thesis (chapter one) showed that Nicaragua’s history has been fraught with disputes over land. Land is critical to food security as it is a key determinant of food productivity and storage capacity, and households draw upon their access to land as an endowment in a number of ways (FAO, 1997; FAO, 2016). Land inequalities can hamper progress in food security, as seen during the Green Revolution when the newly introduced technologies were often unable to reduce existing inequalities and in many cases exacerbated them (Harriss, 1977; Samarasinghe and Samarasinghe, 1984).

Indigenous land is often characterised as being collectively owned, in contrast to the Western system of privatised rights (Migot-Adholla *et al.*, 1991). Migot-Adholla and colleagues (1991) argue this binary view is incorrect; instead land rights exist along a continuum from communal rights at one end to privatised rights at the other. As a result of factors including population pressure, market integration, technological development, livelihood strategy changes, and resource exploitation, there is often a shift towards privatised rights over time (Migot-Adholla *et al.*, 1991; Gray *et al.*, 2008).

The research conducted with indigenous groups in the Ecuadorian Amazon by Gray and colleagues (2008) suggests the encroachment of Mestizo colonists and increased resource extraction contributes towards greater market integration (Gray *et al.*, 2008). Gray *et al.* (2008) also found that when indigenous groups become more market integrated, their land use mirrors that of the colonists. It is very important to note, however, that the Mestizo colonists in Nicaragua do not have the right to exploit indigenous communal lands. This will be explained below.

Indigenous land rights in Nicaragua have received recognition due the well-publicised case of Awas-Tingni, an indigenous Mayanga community. In 1996, the Nicaraguan government granted a Korean company logging rights for the Awas-Tingni community's lands without consulting them (in defiance of international law). The community negotiated with the government before taking the case to the Inter-American Court on Human Rights (Inter-American Court), which ruled the government had violated the American Convention on Human Rights (Grossman, 2001). In a landmark ruling, it asserted that private property could be held collectively (Hale, 2006).

It is worth quoting the judgement at length as it speaks to the importance of the ties between indigenous peoples and their lands:

“Indigenous groups, by the fact of their very existence, have the right to live freely in their own territory; the close ties of indigenous people with the land must be recognized and understood as the fundamental basis of their cultures, their spiritual life, their integrity, and their economic survival. For indigenous communities, relations to the land are not merely a matter of possession and production but a material and spiritual element which they must fully enjoy, even to preserve their cultural legacy and transmit it to future generations”<sup>6</sup>

As part of its recommendation, the Inter-American Court required the Nicaraguan government to “demarcate and title indigenous lands” (Grossman 2002: 13). Subsequently, the 2003 Law of Communal Property Regime of the Indigenous Peoples and Ethnic Communities of the Autonomous Regions of the Atlantic Coast of Nicaragua and of the Rivers Bocay, Coco, Indio and Maíz (Law 445), provided a framework for indigenous territories in Nicaragua to be demarcated and titled (Asamblea Nacional, 2003; Morris, 2016). More than twenty Indigenous Territorial Governments (GTIs) to govern these delineated territories were established, although “tenure conflicts continue for many GTIs” (Morris, 2016: 338).

It is worth noting, however, that titling should not be seen as the end of the process because land rights formalisation ignores the practice of power structures within a society (Peters, 2002). This can be seen in the Rama territory in two ways.

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<sup>6</sup> Mayagna (Sumo) Awas Tingni Cmty. v. Nicaragua, 2001 Inter-Am. Ct. H.R. (ser. C) No. 79, 149

Firstly, there is evidence to suggest small-scale Mestizo farmers settle illegally on small pieces of land within indigenous territories for a short period of time and then sell it on to a large landholder. This leads to “large tracts of coastal lands [being owned by] a small group of Mestizo landowners” (Morris 2016: 358). The impact of this land trafficking on the Rama has been great (Riverstone, 2004; Personal Observation, 2016) and will be discussed in this thesis.

Secondly, as mentioned previously, the Nicaraguan central government is planning on building an Inter-oceanic canal across the width of the country to link the Caribbean Sea to the Pacific Ocean and compete with the Panama Canal. In order to do this, the canal would need to be built across Rama land. Law 800<sup>7</sup>, which sets out the legal framework for the canal, states that the Nicaraguan government has the right to oversee the management, conservation and maintenance of all of the land and resources that lie along the canal route and its neighbouring areas. This law is therefore in conflict with the provisions set out in Law 445 and has contributed towards a marginalisation of those indigenous groups that live along the route (including the Rama).

Lane (2006) argues that the struggles indigenous peoples face to have their land rights recognised are based on three issues. Firstly, European developmentalism has an ideological power, which marginalises indigenous peoples in the planning process. Secondly, indigenous groups do not usually have the capacity to participate in the forums where decisions are made. Finally, indigenous cultural perspectives are generally marginalised. This is seen with the discourse highlighted by Migot-Adholla and colleagues (2006) whereby indigenous land stewardship has been (unfairly) painted as unsustainable and/or inefficient. Offen (2003) adds that the history of Caribbean Coast peoples – first aligning themselves to the British, then Americans, and then their subsequent role in the Contra War – has meant that indigenous Nicaraguans’ claims for recognition are often viewed with suspicion. They are seen to represent a threat to the state’s claims to national sovereignty because of the extent of natural resources contained within the indigenous territories (Offen, 2003). These factors are overlain with cultural portrayals of the historical occupants of the Caribbean Coast being “rootless wanderers” with “little control over their environment” (Offen 2003: 386).

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<sup>7</sup> Ley No. 800: Ley del régimen jurídico de el gran canal interoceánico de Nicaragua y de creación de la autoridad de el gran canal interoceánico de Nicaragua

For the Rama, having control over their land is a fundamental part of their culture. The following section will discuss the importance of linkages between culture and food.

#### *2.4.3: Culture and food*

There are many definitions of culture (Jenks, 1993; Smith, 2000). The one most appropriate to this study is that expounded by Ingold (2000), which argues that culture is the actions and responses of people that have been shaped by a conceptual schemata transmitted from generation to generation.

The utilisation dimension of food security includes the consideration that food should be nutritious, culturally appropriate and locally available. Food's cultural significance goes beyond its nutritional value and in many cases is a key component of a culture's expression (Harris, 2011). Different cultures place different importance on particular food items and how they are prepared or eaten (Harris, 2011; Hien, 2011).

In many settings, particular foods are prioritised over all others. In Yemen, honey is the prized food item and there is great significance and prestige attached to a host who serves honey that comes from the Hadramawt region of the country, which is considered to be the best (Meneley, 2011). The Mayanga, an indigenous group that live in the Bosawás Biosphere Reserve in Nicaragua, place great importance on rice. On a number of occasions it has been sold within their communities for a higher price than the same equivalent weight in meat, despite meat's greater nutritional value (Dr Jeremy Koster, Personal Correspondence, 2014). If the price, quality or availability of these particular food items were affected by climate it could cause hunger within these populations. Simply swapping one food item for another may not be an appropriate coping mechanism in these instances.

Conversely, there are certain foods that in some communities would only be consumed in great amounts in times of emergency. Ellis (2003) found that people living in the Pio-Tura region of Papua New Guinea consider banana corms and wild yams to be 'famine foods' and only ate them when it was absolutely necessary during the 1998 drought. The community also received food aid of brown rice after the worst of the drought was over, but the community preferred white rice so interest in the food aid quickly

dwindled as they had sufficient provisions by that stage (Ellis, 2003). Understanding context-specific issues such as this can help to frame what is considered an acceptable response for the Rama and subsequently when and how responses might be required.

Some foods or ways of handling foods are entwined with a cultural significance not directly related to their consumption. Harris (2011) describes how Brazilian Amazonians believe causes of *Panema* – bad luck in hunting or fishing – include animals coming into contact with poorly discarded food, and if hunted food is eaten by a pregnant woman. Lewis (2008) describes how the concept of Ekila followed by the Mbendjele in Congo-Brazzaville states that laughing at hunted animals or not sharing food properly will harm future success in hunting.

Any community-based food security research that seeks to include the utilisation dimension of food security needs to understand what foods are considered acceptable (or not) in the community studied, and whether food is viewed differently amongst different members of the community.

#### *2.4.4: Climate and culture*

Culture is not only central for food, but also to shaping local understandings of the climate for vulnerable populations, such as the Rama, that are strongly reliant on natural resources for their food security. Culture not only mediates the relationship between humans and the climate, but adaptations to the climate to improve food security are culturally embedded and reliant on local understandings of climate (Magistro and Roncoli, 2001).

Ingold's (2000) definition of culture emphasises the importance of a conceptual schemata. As humans are unable to comprehend the entire world, they use models to frame responses to their experiences (D'Andrade, 1995). This is shown in Paolisso's (2003) research in Chesapeake Bay in the US on how the local crab catchers (called Watermen) understand how blue crab numbers are related to weather conditions. The Watermen recognise that human actions can harm the fisheries, but that the blue crab population size fluctuates naturally according to "God's plan for nature and humans" (Paolisso, 2003: 71). Paolisso (2003) argues this has meant the Watermen have resisted

controls on their own activities to protect crab numbers. Ellis (2003) studied responses to the drought in the Pio-Tura region of Papua New Guinea. He found the community believed that morally improving themselves would directly change the weather. From this, it can be seen that cultural models can limit responses to climate threats. Cultural climate models are formed by the propositions people construct that develop from the slogans, clichés and maxims they repeat to one another (D'Andrade, 1995). These propositions will have been informed by recollections of past climate events (Roncoli *et al.*, 2003). Roncoli and colleagues' (2003) study of farmers in Burkina Faso showed that "recollections of the past, observations of the present, and expectations for the future shape [people's] experience of climate phenomena and [their] understanding of climate information" (Pg. 181). Understanding how vulnerable communities have perceived their relationship to extreme climate events in this way could reveal important information about how they are likely to respond to them in the future. This is one of the reasons this thesis will ask questions about the Rama's experiences of past events.

It is worth discussing the debate surrounding 'local'<sup>8</sup> and 'expert' knowledge because of how the conflict and/or alliance between these could shape food security. The term 'expert knowledge' describes knowledge that has emerged through Western techniques of empirical research. The work of Roncoli and colleagues (2003) in Burkina Faso provides a useful example of what local knowledge looks like. The farmers they studied forecast the likelihood of a good growing season based on a variety of phenomena occurring in the surrounding landscape or in the spiritual world (Roncoli *et al.*, 2003). These include temperatures during the dry season, the production of leaves and fruits, the direction of the winds, fluctuations in water sources, and the movement of the moon and stars (Roncoli *et al.*, 2003).

Recent developments in climate modelling have threatened to undermine the historical value that was placed on local climate knowledge (Sletto, 2005). There has been recognition amongst some scholars, however, that local climate knowledge is an important part of climate change research and the development of adaptation policies (Paolisso, 2003). Without local knowledge being considered, research and policy could fail to recognise the importance of local factors on the ability of communities to respond to climate change (Barnes *et al.*, 2013). Local knowledge can inform adaptation policies

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<sup>8</sup> The term 'local climate knowledge' is contested, and has been variously called 'indigenous climate knowledge' and 'folk climate knowledge' (Roncoli *et al.*, 2003).

and be a bulwark against expert-knowledge led, top-down responses to climate change (Barnes *et al.*, 2013; Sletto, 2005).

This new drive to consider local climate knowledge has been criticised for contributing further towards the creation of a pseudo-colonial system of knowledge (Sletto, 2005). Including local knowledge within research based in Western scholarship ‘dislocates’ it from the context in which it was developed (Sletto, 2005). This is based on the premise that knowledge is a process that is enacted in the everyday rather than something that can be stored (Cote and Nightingale, 2012). Sletto’s (2005) work on local fishing knowledge in the Nariva swamp in Trinidad shows that once local knowledge becomes divorced from its context in this manner it becomes ‘romanticised’ and ‘fossilised’. Local knowledge is posited as ‘common sense’, whereas Western science is objective, systematic and all knowing (Sletto, 2005).

Although some Western literature is keen to flag up local knowledge and pay lip service to its importance, it is often then immediately discredited or dismissed through direct comparisons with expert knowledge (Roncoli *et al.*, 2003; Paolisso, 2003). For example, Thomas and colleagues (2007) investigated South African farmers’ responses to intra-seasonal precipitation trends. Their research is based on an ‘end-point’ model, whereby the authors used modeling to elicit an expert model of rainfall in specific locations and then conducted interviews to see if these rainfall patterns were ‘recognised’ by those who lived there. The analysis used was a process of “comparing statistical patterns in the data with patterns in coded thematic interview narratives” (Thomas *et al.*, 2007: 310). One risk with this sort of validation exercise is that the interviews are only considered valid when they fit with the ‘expert’ knowledge.

This is important because regardless of the accuracy of formal forecasts, farmers in these communities still make their decisions based on their own methods of prediction (Bryan *et al.*, 2013), even when they are aware of the existence of Western methods of prediction (Rudiak-Gould, 2011).

In the study by Roncoli and colleagues (2003), it was hoped that by disseminating forecasts based on expert knowledge, the farmers in Burkina Faso could plan their harvest better. The researchers concluded the forecasts did not achieve this because they were altered through their “incorporation into a different set of meanings and relations



from those that produced such knowledge” (Roncoli *et al.*, 2003: 197). The dissemination of the information was bound up in existing political, ethnic and gender inequalities that meant some women were unable to attend the meetings and others were excluded from them (Roncoli *et al.*, 2003). Equally, although the expert forecasts were not accurate (in the binary sense of either predicting the correct amount of rain or not), it mattered little for most farmers. They were well aware of the uncertainty of forecasts in general and had amalgamated the new information into their existing methods of prediction rather than rely on it (Roncoli *et al.*, 2003). Farmers in Burkina Faso also tend not to make planting decisions based on forecasts, instead waiting to “corroborate forecasts with what happens at the onset of the rainy season” (Roncoli *et al.*, 2003: 190). This is similar to Madiama in Mali where farmers plant sorghum and millet (which have different tolerances to rainfall) and then cut down one of these early depending on the rainfall level (Crane, Roncoli and Hoogenboom, 2011).

This sub-section has shown the importance of understanding local knowledge, local issues and existing coping strategies to understand the differences in food security risk and responses to food security risk that occur in small communities. If there are different systems of knowing, there will be different responses to food security threats.

#### *2.4.5: Food sharing*

Research has suggested that individuals use their social networks to reduce their vulnerability to food insecurity (Hadley *et al.*, 2011). Within this, the importance of how food is shared is highlighted in the quote below:

“Food security and insecurity can only be understood in the broader context of culturally shaped and highly valued rules for sharing food and extending meagre food supplies.”

*Van Esterik (2011: 67)*

In relation to specific periods of stress, the strength of the relationships between individuals in a community has been acknowledged as a key factor in surviving food scarcity (Allen, 2000). Ellis (2003) found that when faced with food scarcity in 1998,

the community in the Pio-Tura region of Papua New Guinea believed they would do best by working more closely with one another.

It is important, therefore, that how the Rama share food is considered in this thesis as it could shape how they respond to threats to their food security as well as have an impact on the drivers of risk in the community. This sub-section of the literature review will briefly outline the key terminology and then outline some case studies showing how food is shared differently in different communities and during crises. The review focuses on food sharing research conducted by anthropologists as this research is based on case studies of communities that are similar to the Rama.

Anthropologists have espoused a number of different hypotheses in an attempt to explain how and why traditional societies share food. From these, four models have emerged that have largely subsumed all the other hypotheses in the view of most scholars. Of these, those most likely to be relevant for the Rama are kinship selection and reciprocal altruism.

Kinship selection predicts that an individual or family will be biased towards sharing more food with kin than they do with non-kin. Even if giving away food is costly to the donor, the model presumes that the “evolutionary benefits of sharing with relatives at the allelic level can be recouped via the reproductive success of genetically similar recipients” (Koster and Leckie, 2014: 100). There is also evidence that people are more likely to share with the people they live closest to, though the effects are compounded by the fact that individuals tend to live closer to people to whom they are related (Gurven, 2004; Lewis 2008). Koster and Leckie (2014) tested for this effect and concluded that food sharing takes place within “multi-faceted inter-household relationships” (pg. 101).

The Reciprocal altruism model was first outlined by Trivers (1971) and posits that individuals, households or groups share with others in an altruistic manner, in the expectation they will receive something in the future. The potential future receipt of food is the incentive for present giving (Trivers, 1971). This model suggests that the sharers will continue to give provided the costs of sharing in the present are outweighed by the expected returns in the future from the recipients of that sharing (Gurven, 2004).

The validity of these models to explain food sharing in various communities has been extensively tested using multivariate models and ethnographic fieldwork (Koster and Leckie, 2014), but in his wide-ranging review of the evidence, Gurven (2004) concluded that no model could easily explain the pattern of food sharing in traditional societies on their own. This may be because this type of research has largely focused on the sharing of meat at the expense of other food groups and the exchange of other non-food services that may play a part in reciprocation. There is evidence that food gifts are reciprocated through non-food goods and services such as cash, loans, childcare, sharing of technology or land, political support, labour, and other food resources (Koster, 2011; Nolin, 2012).

Other research has shown there are considerable differences between traditional societies in how food is shared. For example, Nicholas's (2011) research on the sharing of food within Zaouiya in Morocco found that eating a meal outside what Nicholas calls the individual's 'entourage' – be that on one's own or in a large group outside the household – was frowned upon. Speth (1990) points to variations between different cultures in relation to the access that women have to animal flesh and fat. Based on the research of White (1985) and Hetzel (1978), Speth (1990: 172) explains that some Australian aboriginal groups "blatantly prevent women from eating animal fat [for] most of their lives". In contrast, men receive more meat than women in the Kalahari San, Hadza and Aka Pygmy societies, but in a more subtle manner. Amongst the Penan Gang and the Ache, kills are carefully divided up to ensure women receive equitable portions (Kaplan *et al.*, 1985; Speth, 1990). The Mbendjele men and women of the Congo share in different ways that are related to gender roles and their different productive activities—women focus on labour intensive, but dependable food sources and share them amongst themselves and the whole community, whereas men focus on large yielding, but more rare food items and will only share if they are able to acquire these in great abundance (Lewis, 2005).

The distribution of food in general – whether within entire communities or households – is frequently gender-biased to the disadvantage of women (Counihan and Kaplan, 1998). Although women often make food purchasing decisions and are in control of preparing food, having this responsibility does not mean they have control as men often dictate the type of food eaten, how it is served and how much is served (McIntosh and Zey, 2010). Amongst traditional societies, therefore, societal constraints may have a big

impact on how food is shared, particularly if these constraints change over time. Individual relationships are also likely to be important, particularly in times of crisis. For these reasons, it is important to have a fine-grained understanding of how the Rama share food. One of the ways in which societal constraints could change in indigenous societies is through alterations in diet and/or greater market integration. This will be discussed in the following section.

#### *2.4.6: Market integration*

Most indigenous groups do not rely entirely on subsistence livelihoods, but are integrated into the local, regional and sometimes global markets to different extents (Byron 2003). This section will define market integration and highlight the ways in which the degree of a group's market integration can have an impact on a number of factors that are significant for their food security.

It is first worth cautioning, however, against the idea of indigenous groups as either market-oriented or subsistence-oriented. This is a false binary: many individuals will engage in both livelihood strategies to various extents (Lu, 2007). It also cannot be assumed that indigenous communities will inevitably increase their market engagement over time. Ziker (2002) showed that the indigenous Dolgan and Nganasan populations of central Taimyr in the Soviet Union were progressively integrated into the market economy over time, but after the collapse of communism, their traditional practices (including food sharing) regained importance.

Market integration can be defined generally as encapsulating the exchange of goods and services with markets, and the participation of individuals in market-based activities, but there is a wide range of alternatives. Gross *et al.* (1979) described market integration as the extent to which goods and services are exchanged outside the indigenous community. Henrich (1997) defined it as the extent to which communities participate in the market. Lu (2007: 594) defined it as “the commodification of labor, capital, land, and goods and services”.

Measuring market integration is not straightforward. Researchers have recorded factors such as the possession of certain market intensive items, including those requiring fuel

or ammunition (Lu, 2007), time allocated to market activities (Henrich, 1997), as well as the types of activities undertaken by the communities, and/or their proximity to markets (Godoy *et al.*, 2005).

All three of these measures have weaknesses. For example, Lu (2007) warns there is a danger in merely measuring household possessions as some individuals may have acquired these as gifts or through remittances or theft. The unit of analysis is also important as measurement at the individual, household or community level will give a different picture of the social stratification of market integration. Focusing on the household level, for example, obscures the way in which households become more market integrated: by the distribution of time and skills throughout extended families, allowing different members to diversify into different activities (Morsello, 2002).

There is no clear consensus on whether market integration is positive or negative, most likely because of the variation in definitions, measurement and between indigenous populations globally (O’Faircheallaigh, 1998). There is some evidence, however, that market integration can contribute towards the erosion of tradition sharing and collectivised practices (Behrens, 1992), affect health status both positively and negatively (Byron, 2003), and through changes in farming practices (such as cash cropping) and other resource-based activities, lead to land use changes, environmental degradation and biodiversity loss (Barbier and Burgess, 1997; Crook and Clapp, 1998; Coomes *et al.*, 2010; Gray *et al.*, 2008).

As noted already in this chapter, there is evidence that all of these factors contribute towards the food security status of a community. There is also evidence that market integration can lead directly to changes in diets (Houck *et al.*, 2013; Urlacher *et al.*, 2016). As a result, it will be important to understand the differences in levels of market integration between households in order to fully appreciate the stratification of food security amongst the Rama community.

## **2.5: Chapter summary**

This chapter has reviewed the literature that is relevant to this thesis, highlighting the gaps in current scholarship and how this project will make a contribution. The first

section of the chapter started by reviewing the history of food security as a global concern and discussing the transition towards the Food Entitlement Decline (FED) view of global food security being the predominant paradigm. It expanded on the four dimensions of food security drawn from this paradigm – availability, access, utilisation and stability – and showed that research and policy debates have tended to focus on food availability. Through doing so, it highlighted the need for more research that seeks to encapsulate all four dimensions of food security.

The first section then showed that food insecurity is caused by multiple drivers, usually through an interaction of a number of these and other mediating factors. To investigate food security at the household level requires an understanding of the way these factors operate on the ground. Finally, the section reviewed the way food security is measured and argued that there is no ‘gold standard’ measure of food security, but that an Emergency Food Security Assessments (EFSAs) would suit this project because they are designed to capture the widest range of data and indicators. The EFSA chosen was the Household Economy Analysis (HEA) framework and this will be discussed in the following chapter.

The second section of the chapter reviewed the concepts of vulnerability and resilience. It outlined two types of vulnerability – biophysical and social – and highlighted how each approach facilitated a different analytical focus. It showed that social vulnerability is a useful framework for understanding food security at the household level because it recognises that vulnerability can be produced within a socio-economic system (SES). In the discussion on resilience, it highlighted the idea of perverse resilience and showed how there are constructive tensions within the concept relating to scale, space and time. This indicated that enquiries in this thesis should focus on investigating heterogeneity with these dimensions.

The third section of the chapter discussed the ways that households respond to food insecurity. It reviewed common coping strategies and the literature on livelihood diversification. It then discussed adaptation, focused primarily on how the concept has been conceptualised in the climate change literature. It discussed Pelling’s (2011) concept of transformational adaptation, which is defined as adaptation actions that seek to address the root causes of vulnerability, rather than merely boosting resilience. It highlighted that this concept privileges the functioning of institutions and does not take

into account that these can change over time. This indicated that enquiries in this thesis should investigate context-specific drivers of food security vulnerability and resilience.

The fourth section of the chapter focused on the potential context-specific drivers of food security. It started by outlining definitions of indigeneity before discussing the importance of land issues on the Caribbean Coast. The sub-section on culture and food showed it is important to understand what foods are acceptable (and unacceptable) for the Rama in order to analyse the utilisation dimension of food security. The third sub-section focused on the links between culture and climate. This was done to highlight the importance of considering local knowledge as it is likely that different perceptions of climate between households could lead to different levels of vulnerability and resilience. The fourth sub-section focused on food sharing, highlighting the different models that have been suggested in the anthropological literature as well as notable qualitative research. It showed that it will be important to understand how the Rama share food because it is likely to be an important dimension of their foodways and could shape how they respond to threats to their food security. The fifth sub-section outlined the literature on market integration because there is evidence that market integration can lead directly to changes in diets and differences in levels of market integration between households could influence the stratification of food insecurity amongst the Rama community. The following chapter will discuss the methodology of the thesis.





### 3. Methodology

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This thesis is a fine-grained analysis of the food security of the Rama indigenous group in Nicaragua. In order to achieve this, the research project needed to use an appropriate methodology. As stated in sub-section 2.1.2 of chapter two, an Emergency Food Security Assessment (EFSA) methodology was used. EFSA's are designed to capture much of the information required by the thesis, such as understanding the types and amount of food eaten by the target population and their livelihood strategies.

This research project adapted an EFSA tool called the Household Economy Analysis (HEA). It has been used to study the impact of climate change on food security in a number of different countries and also been used in academic research (Misselhorn, 2005; Giannini *et al.*, 2017). The individual methods used were household surveys, dietary surveys, semi-structured interviews, and observations. These methods are both quantitative (the surveys) and qualitative (the interviews and observations), thus the study is a mixed-methods investigation. These methods were chosen because meeting the research objectives was reliant on being able to capture two different types of data.

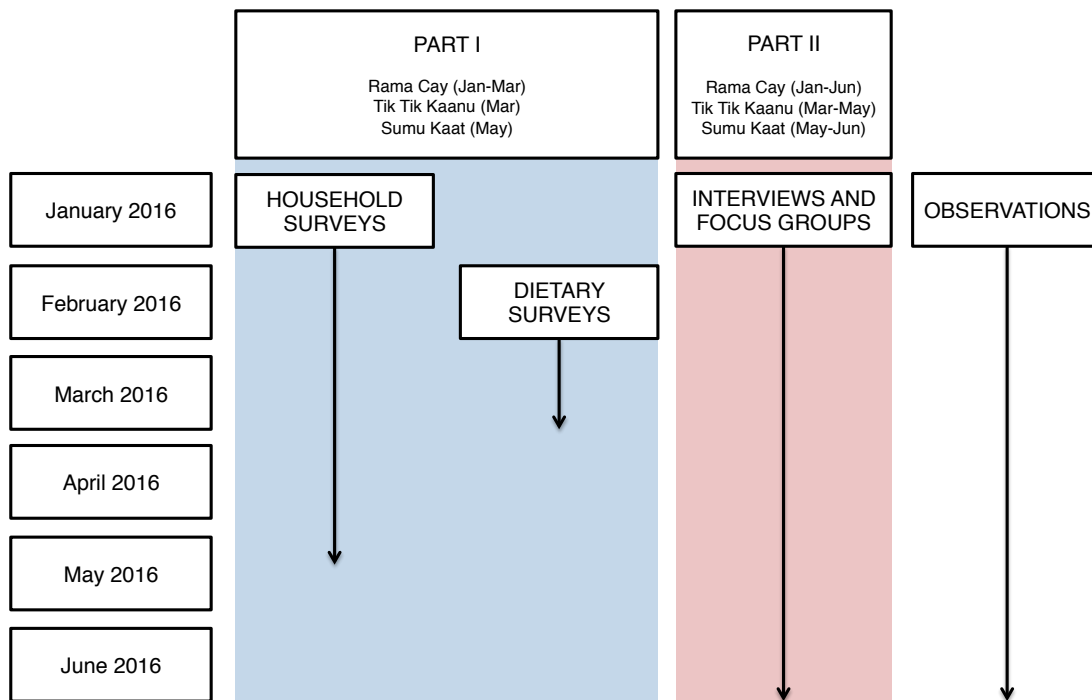
The surveys were used to determine a baseline of the current food security of the Rama, analysing the potential impact of specified threats on the Rama's food security and, to a certain extent, describing the foodways of the Rama. The surveys were able to efficiently capture information about the research participants that can be generalised to other contexts and provided a quantitative basis for the modelling. Both household surveys and dietary surveys were used and these will be discussed in more detail in Section 3.2.1 and 3.2.2 (below).

The interviews and observations were used to determine what threats the Rama perceive to their food security and how they respond to them, and to investigate factors such as individual perceptions, cultural practices and social inequality. The interviews were also designed to expand on the survey findings. This will be discussed in more depth in sub-section 3.2.3 (below).

The fieldwork was arranged as shown in Figure 3.1 (below), with the household and dietary surveys conducted first and the interviews conducted afterwards. During both parts of the study, observations were made and form part of the qualitative data

analysed for the study. As data from all of the methods were used to establish the directions of the findings or contribute towards the analysis of the other methods, the study design can therefore be said to be a sequential and explanatory mixed-methods model (Creswell and Plano Clark, 2011). Section 3.3 of this chapter will explain the challenges of mixing qualitative and quantitative methods.

**Figure 3.1: Data collection procedural diagram<sup>1</sup>**



Source: Author

This chapter is structured into seven sections and will explain why these methods were chosen, how they were used in practice, and the ethical considerations of the research project. The first section will outline the history of the HEA and provide more detail about the different stages of the process. The second section will explain how and why the HEA was adapted for this project and discuss the individual methods (principally surveys, interviews and observation), and the way they were developed. The third section will outline the challenges and advantages of mixed-methods. The fourth section will discuss the ethical considerations of the study. The fifth section of the chapter will describe the data collection, including the initial recruitment of respondents to the study, and the challenges faced at various points during the fieldwork period. The sixth section will discuss how the collected data were analysed and the final section will summarise the chapter.

<sup>1</sup> Rama Cay, Tik Tik Kaanu and Sumu Kaat are the research sites and were described in chapter one.

### 3.1 The Household Economy Analysis (HEA)

This thesis used an adaptation of an analytical framework called the Household Economy Analysis (HEA) to provide its methodological structure. The HEA – in its unadapted form – is used to model the potential impact of a variety of changes<sup>2</sup> on food availability and understand how communities respond to these changes (Holzman, 2008). It has been used in a number of countries, including Nicaragua.

The HEA can be used determine what foods are eaten in a particular community and their relative contribution to diets (measured in calories), and can be used to inform decisions on a variety of policy responses including humanitarian relief, social protection planning, needs assessments and poverty reduction (Boudreau, 1998; Holzmann *et al.*, 2008). It was developed between 1992 and 1997 to analyse the way people obtain access to food (and other items important to live and prosper) and to determine what assistance they may need (Boudreau, 1998; Seaman *et al.*, 2000). It was derived from the famine early warning systems that were developed in the 1980s in response to the 1974 Sahel drought (Holt, 2014). These methods were used to predict the impact that certain weather events could have on the likelihood of food shortages occurring in particular populations. For example, if a particular population is known to rely heavily on a food source that is vulnerable to drought, it might be expected that food aid would be required when drought does occur.

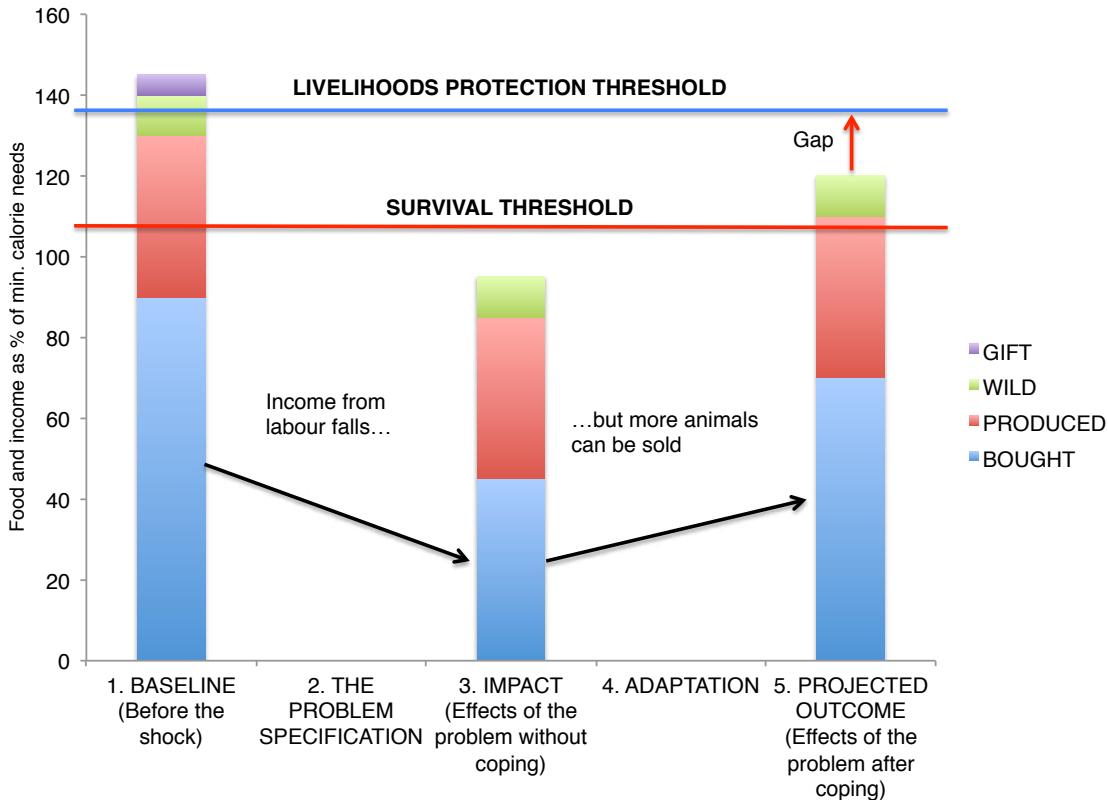
The HEA does not necessarily use one specific method, but it is intended to be a rapid appraisal tool and so has generally relied on focus groups with key informants and secondary data (Boudreau, 1998). Difference within communities is measured based on grouping households in three-to-five different wealth groupings (Boudreau, 1998; Seaman *et al.*, 2000).

The five stages of the HEA were briefly outlined in the introduction to this thesis, aided by Figure 1.5, which is reproduced here as Figure 3.2 (below). The rest of this section will describe these stages in more detail.

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<sup>2</sup> Changes that can be modeled by the HEA can be positive or negative and have included climate shocks, market failures, changes in local employment opportunities and land disputes.

**Figure 3.2: A schematic of the Household Economy Analysis**



Source: Adapted from Boudreau *et al.* (2008)

The first stage of the HEA is called the Baseline (shown in Figure 3.2 above). HEA researchers give weightings to the studied population’s food sources according to what percentage each source provides of the recommended daily calorie intake. These sources might include the calories they acquire by buying food and the calories they acquire through fishing, farming and hunting.

For the purposes of this study, these sources have been divided into four categories<sup>3</sup>:

1. ‘Bought’ food is the food the Rama eat that they have purchased with cash acquired from employment, the sale of items or other sources;
2. ‘Produced’ food is that which has been grown on the Rama’s plantations;
3. ‘Wild’ food is that which has been sourced through hunting, fishing or foraging;
4. ‘Gift’ food is the food that the Rama receive without a cash charge from other Rama households, NGOs or other sources (though some other form of reciprocation may be expected).

<sup>3</sup> See sub-section 3.2.2 for more details

The results of this stage are measured against two thresholds: the Survival Threshold and the Livelihoods Protection Threshold. The Survival Threshold covers the minimum calorie budget required for the household to survive and is calculated as being 2100kcal per person per day by the HEA<sup>4</sup>. The Livelihoods Protection Threshold additionally covers whether households can use the food they are able to source, and thus includes their ability to afford items such as cooking utensils and soap, as well as access to clean drinking water (Holzmann *et al.*, 2008).

The second stage of the HEA is called the Problem Specification. This is based on identified threats to a household's food sources. For example if there is a flood, a family's income might fall because they are no longer able to access the farm where they work. The third stage of the HEA is called the Impact and this models the impacts of threats (outlined in the Problem Specification) on the household's calorie budget. It indicates whether or not an identified threat could cause the household to be unable to meet either of the two thresholds.

The fourth stage of the HEA is the Adaptation stage, which identifies the adaptation responses that the households are likely to follow should their food calorie budgets be reduced by the threats outlined in the Problem Specification. This stage is designed to determine the adaptation responses (called coping strategies in the original HEA framework) that are both possible and acceptable by distinguishing between effective and harmful responses (Boudreau *et al.*, 2008). For this reason, the 'cost' of the adaptations identified are also considered. For example, although they might allow households to meet one or both of the thresholds if income falls due to a flood, selling assets at unfavourable prices, reducing spending on children's education, relying on income from child labour, or resorting to drug dealing, prostitution or other illegal activities are likely to be harmful responses.

The final stage of the HEA is the Projected Outcome that shows the impact of the adaptations on the household's calorie budgets.

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<sup>4</sup> Because the ages of all household members, including children, were included in the data collection of this project, it was possible to calculate a more accurate calorie measure. This is explained further in Section 3.6 of this chapter.

### 3.1.1: Limitations of calories

The HEA relies on analysis of the calorie content of food. It is therefore worth briefly noting that while calories are a useful tool to depict relative food security within communities, there are limitations to their use.

Firstly, research has consistently shown that the given calorie amounts for specific foods are frequently incorrect, in part because they are based on average estimates (Hollis and Mattes, 2005; Novotny *et al.*, 2012; Finglas *et al.*, 2015), and also because the way food is prepared and cooked can affect the energy that a consumer is able to receive from the food they eat (Finglas *et al.*, 2015).

Secondly, calories only measure energy and do not take into account the micro-nutrient and macro-nutrient differences that can have a big impact on diet quality (Stanhope, 2018). An intervention study by Zemel *et al.* (2004) showed that even when three groups of obese adults were proscribed diets containing the same amount of calories, but with differences in the calcium and dairy content, there were significant differences in weight loss between the groups.

Thirdly, the human body breaks down different types of food differently. For example, there are differences in the way that processed foods and non-processed foods are digested, and this is not taken into account by calorie measurements (Barr and Wright, 2010; Dunn, 2013). These limitations mean that two individuals consuming the same number of calories could have a very different food security status. For example, if one is eating a varied and balanced diet and the other is only eating one type of unhealthy food.

Despite these limitations, calories were used for three reasons: firstly, the original HEA framework uses them and so repeating this decision allows for an easier comparison; secondly, they are an accepted, uniform measure that can be compared with other studies; and thirdly, the alternatives – such as calculating micro-nutrient contents of food items – are time consuming, would likely be more invasive for the study's participants, and in some cases would require expensive, specialist equipment.

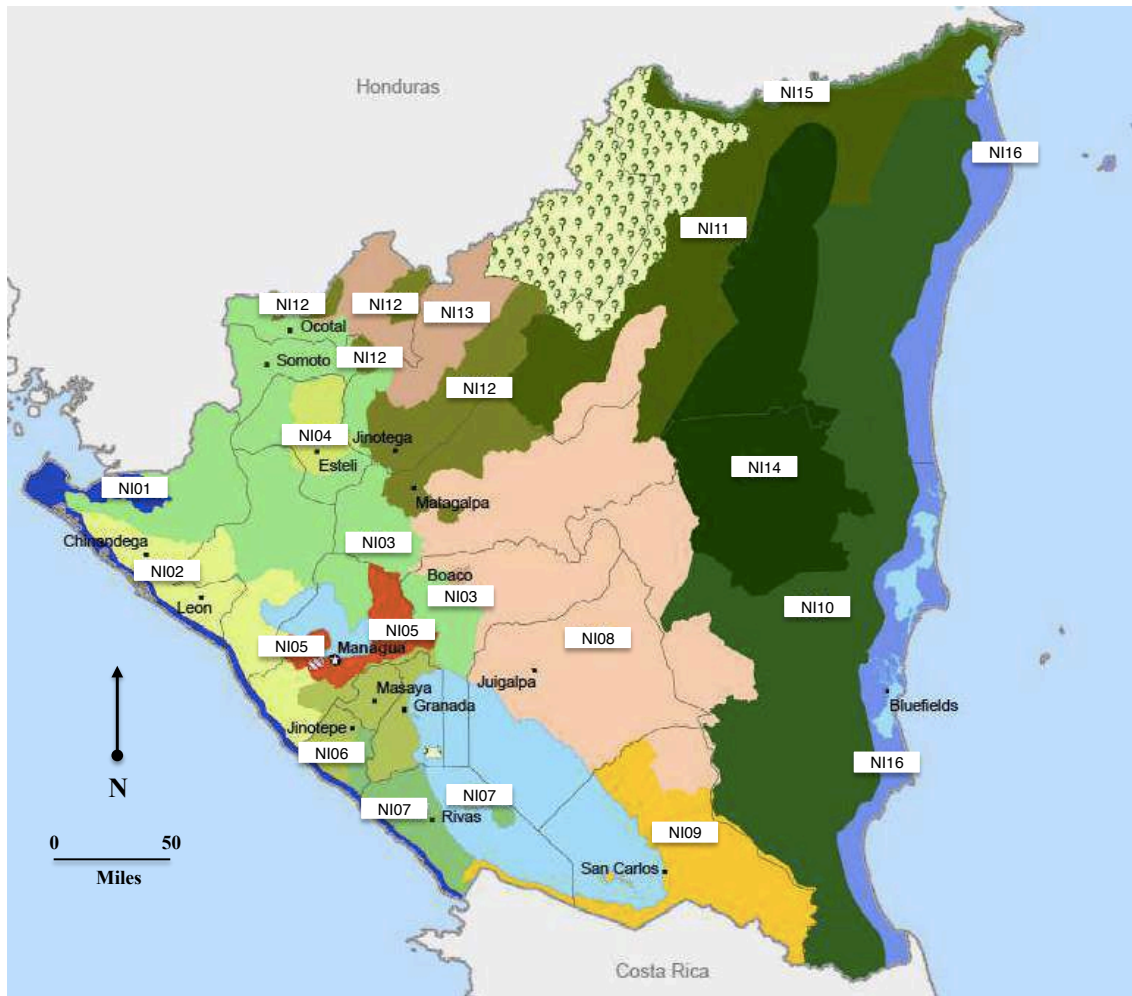
## **3.2: Adaptation of the HEA**

This section will outline why and how the HEA was adapted for use by this research project. It will begin by outlining the framework's limitations and the general changes that were made for this project. It will then outline the development, protocol and limitations of the individual methods that were used in the adaptation of the HEA (surveys, interviews and observations).

### *3.2.1: Reasons for the adaptation*

Because it was designed for a narrow purpose – to provide a rapid appraisal of need – the original HEA framework has four main limitations (Boudreau, 1998). There is some crossover between these limitations as most have an impact on the HEA's ability to distinguish differences within a community. Firstly, the data collected come from a relatively limited pool of respondents (compared to the population of the region where the data is taken to represent) and is therefore liable to miss important points of view. Secondly, the HEA analysis is based on the concept of livelihood zones, with the population within these zones presumed to follow the same livelihood strategy. The livelihood zone map for Nicaragua (reproduced below as Figure 3.3) shows the entire seaboard of the Caribbean Coast region as following the same livelihood strategy (NI16 – Caribbean Coast Traditional Fishing Zone). Not only has research shown this is not to be the case (Pineda, 2006), but as already established in the literature review, many individuals in developing countries maintain a portfolio of strategies that cannot be easily classified and each of which may be affected differently by change (Ellis, 2000).

**Figure 3.3: Livelihood zones of Nicaragua\***



Source: Browne (2009)

\*According to the Food Economy Group (FEG)—a food security consultancy based in the US. For the map key, please see pg. 37. The Rama live in Zone NI16.

Thirdly, the original HEA framework only breaks the population into three to five groups (based on wealth) within each of these livelihood zones. For this reason, heterogeneity determined by factors other than wealth within these (sometimes very large) geographical regions could be obscured and important sub-groups might be missed. For example, in the case study area, the Rama communities that are largely culturally homogenous would not be separated from the multicultural communities elsewhere in the region. This factor, interacting with the small sample size collected in focus groups, increases the chance that the food data collected is subjected to recall and social desirability biases, and distortions caused by regional or community power relations, and does not consider issues like culture and individual perceptions and motivations. Lastly, the HEA analysis is based on predictive, calorie-based modelling of



the impacts of threats on food security, meaning it is less able to analyse how different factors might interact with each other to influence food security in real situations.

These limitations mean the original HEA framework is less able to provide the fine-grained, in-depth analysis of the food security of specific communities and the threats they face required for this thesis. The adaptation of the HEA used for this thesis follows the proven adaptability of the original HEA framework – shown through its ability to work with different methods such as the sustainable livelihoods framework (Holzmann *et al.*, 2008) – but addresses these limitations. The following sub-sections (3.2.2 to 3.2.6) outline what changes were made to the framework to achieve this.

### *3.2.2: General changes*

As previously explained, the adaptation of the HEA used for this project was based on surveys, interviews and observations in a sequential and explanatory mixed-methods design. Two types of surveys were used. Firstly, the household surveys collected data about what the Rama typically eat and allowed a larger number of participants to contribute to the research, thus reducing the chance that any diversity in livelihood strategies was missed. It meant calorie budget baselines could be produced for many more households—110 individual calories baselines were produced by this research in comparison to the 6-10 (two for each wealth grouping) normally produced by with a typical HEA assessment. Secondly, the dietary surveys allowed the collection of ‘real’ data of what the Rama actually eat on a day-to-day basis. This reduces the chance of recall bias because data were collected either on the day, or the day after food items were consumed (see sub-section 3.2.4, below, for more detail), and also allows the potential for more detailed analysis of dietary quality.

The semi-structured interviews were designed to allow for a more in-depth understanding of culture and individual perceptions and motivations to be recorded. Participants were also more able to discuss what they wanted to talk about without being subject to the societal pressure that may have been exerted in a focus group.

The other general change, affecting the surveys, was to adopt the calorie groupings of Bought, Produced, Wild and Gift for the calorie budget baselines and models (as

mentioned in Section 3.1). The original HEA framework classifies household's calorie budgets into groupings such as 'Milk', 'Crops' and 'Labour'. As the data behind the calorie budget baselines and models is the same (the food that families eat), this is largely a presentation decision, but it was felt that this was more appropriate for this study for the three reasons outlined in the following paragraph.

Firstly, when responding to threats to their food security, populations often do not source replacement calories from different food groups, but instead change the way they source the calories in the food group (Crane, Roncoli and Hoogenboom, 2011). For example if a bean crop fails, a population is more likely to sell other items to buy beans than to switch to another type of food. Secondly, presenting the data in this way allows for a clearer presentation of the Rama's foodways (the data about other factors such as employment were collected by other methods such as the semi-structured interviews). Finally, these groupings allow a comparison with the work of other foodways research with Nicaraguan indigenous groups that have used the Bought, Produced, Wild and Gift basis (Koster, Personal Communication, 2015), and also matches the categories of food entitlements outlined by Amartya Sen (Devereux, 1988).

### *3.2.3: Household surveys*

The main part of the household surveys (sections S4 and S5<sup>5</sup>), were designed to capture baseline data about the Rama's food. The criteria for selecting suitable elements from the HEA to be included in the surveys included their relevance to the project's aims, their relevance to the case study and how easy Rama respondents would find them to answer. These judgements were made based on the findings of the pilot study that was conducted in January 2015 and then adjusted through conversations with local experts, and key informants in 2016. The conversations in 2016 suggested the pilot survey was too lengthy, so the survey elements that could be answered through other means were identified and removed.

The design of the demographic, wealth and other key data (sections S1, S2 and S3) drew on two sources. The first was the original HEA and the second was a survey used by Dr Jeremy Koster on a research trip to the Bosawás Biosphere Reserve in January

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<sup>5</sup> An example household survey used for the research project is included in Appendix 1.

2015. Both sources have been used in Nicaragua and Dr Koster's survey is appropriate because it was designed for the Mayanga indigenous group, which has some cultural similarities to the Rama. Part of this element of the survey has a list of typical household possessions – including electrical goods and household tools – and asks respondents how many they own of each.

Other elements of the baseline – including the Rama's interaction with markets, labour opportunities, the extent of participation in wild-food sourcing (hunting, fishing and gathering), the threats to their food, the potential impact of these threats and the Rama's adaptations to these threats were asked about during the semi-structured interviews (see sub-section 3.2.5 of this chapter, below). This was done because a less prescriptive methodology was more appropriate for capturing the diversity in opinions and nuances of these data (Corbin and Strauss, 2008).

In terms of sampling, the HEA uses the individual household model (IHM) to allow each household to be profiled individually and this was adapted for this study. For this study, it was feasible to try and capture all the households in the three communities, which is presumed to number approximately 120 in total. This number was reached based on the literature, observations in the communities in 2015 and during the data collection period in 2016. As mentioned in the introduction to this thesis, it is not possible to determine exactly how many Rama live in the Rama territory because no formal census has been published since 2005.

Before conducting the fieldwork, the intention was for the household member with overall responsibility for food provision to be surveyed. Because of the gendered split of Rama activities, it was anticipated that these would be women, as they tend to be responsible for food preparation, whereas Rama men are frequently absent from the home to fish, farm or work. Because of the timing of these latter activities and the data collection, however, both men and women were surveyed. This allowed an important and improved understanding of all the activities related to foodways and food practices. Although this meant one household member shaped the views and experiences of the rest of the household, this was appropriate because they were chosen because of their position within the household.

These household surveys had four limitations. Firstly, as the categories in the surveys were pre-described (Secor, 2010), they were not able to effectively depict all of the individual differences in the Rama's food practices. The mixed-methods used by this project, however, meant this limitation was reduced (see Section 3.3).

Secondly, the research data was biased by the season in which it was collected. The designers of the original HEA framework state it is important to collect data at varied times of the year to account for seasonal variability (Holzman *et al.*, 2008). Because of time and the budget available to conduct the fieldwork for this study, however, this was not possible. Participants were asked to comment on seasonal variability during the interviews, but this was reliant on respondents' memories so recall bias is a factor that needs to be considered.

A potential third limitation was sampling bias as many Rama migrate between the Rama communities to be able to hunt, fish and farm during the most appropriate season. A concern before conducting the fieldwork was that some families might be missed if the research visits did not coincide with these movements and so the families that migrate the most would be under-represented in the sample. In reality, however, the Rama migrated less during the fieldwork period than was suggested by the literature. Two families in Sumu Kaat were missed because they were working elsewhere when the community was visited (see Section 3.4), but the length of the fieldwork period and careful checking of records meant that most Rama families in the communities could be contacted and included in the study.

A fourth limitation was that the household surveys were unable to show daily fluctuations such as food prices, personal preferences and cooking methods. This is the reason the dietary surveys were also collected. See sub-section 3.2.4 (below) for a more detailed explanation.

Despite these limitations, however, there were three main advantages of the household surveys. Firstly, they provided a basic overview of the study population's demographics, livelihood strategies and relative wealth. Secondly, they provided an understanding of the types of food the Rama eat, how much they eat and how they source it. Finally, they provided a useful initial contact with the community and helped to build a rapport, which was key to the rest of the data collection process.

#### *3.2.4: Dietary surveys*

During the process of data collection, it was decided to also conduct dietary surveys because it was found that the household surveys were unable to show daily fluctuations. Respondents quite often said their food came from two or more sources, sometimes buying their beans and sometimes eating beans they produced themselves. Although the Rama were asked to provide a relative contribution of these two sources, if they were unable to do so, the item eaten was split evenly for the purposes of data collection. For example, if they said they ate 2lbs of beans everyday sourced from their own production and by buying it at the market, 1lb was noted as being bought and the other 1lb was noted as being produced. Due to seasonal fluctuations, however, this may not actually reflect the relative contribution of these two sources at any given point. Equally, the design of the survey meant that respondents tended to give average costs for each food item, regardless of seasonal changes and the number of sub-categories within that item. This was particularly problematic for fish. The Rama eat 56 different species of fish and each one has a different price that reflects its size and quality. The cost range per pound of fish given by respondents in the surveys was between 12 and 35C\$ (US\$0.42-1.25). How this problem was dealt with is explained in sub-section 3.2.6 (below).

Another problem that was revealed by additional questioning during the surveys was how the Rama perceived some questions. Only 13 families of the 110 surveyed said they ate bread, but through observations in 2015 and 2016, I knew that a lot of families baked and sold bread to other Rama families. It transpired that some Rama feel they have not had breakfast if they have only consumed bread and coffee at breakfast time. In these instances, when they were asked what they normally had for breakfast, they would say they didn't eat breakfast if they had only consumed bread and coffee, and these items would not be included in their responses.

The dietary surveys were thus designed to provide greater detail of Rama food practices by collecting data about every meal and food transaction from nine families. The families were chosen to try and capture as many different livelihood strategies as possible. These data were used to calculate Stage 3 of the HEA (the impact) and will be discussed in more detail in chapter six.

Because of the timing of data collection and the varied roles that were undertaken by the chosen families, it would not have been possible to talk to each family member in these families regularly enough. Instead the dietary surveys asked key household informants what food their entire household had eaten that day and how many people had been present at each meal<sup>6</sup>. This roughly follows the survey design used by Dr Jeremy Koster to collect daily food data for Mayanga families in the Bosawás Biosphere Reserve.

The key limitation of using this method was that individual preferences and appetites amongst individuals within a family are obscured. It is presumed that each quantity of food cooked for the entire family is split evenly amongst household individuals according to calorie requirements dictated by gender and age. It does, however, provide much greater detail than would have been possible with the household surveys. More information about how the dietary survey data were collected is included in Section 3.5 of this chapter.

These data were used as the basis for the modelling of threats to the Rama food, which is discussed in chapter six and forms part of Stage 3 of the HEA (the impact). The rationale for using modeling and the limitations of this technique are outlined in sub-section 3.2.6 (below).

### *3.2.5: Modelling*

The impact of specified threats to the Rama's food security are modelled onto the baseline data of selected Rama households in chapter six of this thesis. The method used closely matches that of the original HEA framework. The dietary recall data outlined in the previous sub-section (3.2.4, above) is combined with the data on the perceived threats to the Rama's food security gathered in the semi-structured interviews outlined in the following sub-section (3.2.6, below).

Generally, a model can be defined as something that generates a prediction or theory (Macmillan, 1989a). They can be useful for measuring observed or unobservable phenomena, for making sense of available data, and for predicting or estimating the operation of systems of the effects of changes (McGill, 1989; Demerit and Wainwright,

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<sup>6</sup> An example dietary survey used for the research project is included in Appendix 2.

2005). The rationale for the modelling in the original HEA framework is that it allows a quantification of the risk to a community's food security in the face of specified threats, a rapid assessment of food relief requirements, and for comparisons to be made between different communities and regions (Boudreau, 1998; Boudreau et al., 2008).

Some scholars have argued that models represent a simplification of phenomena and they are therefore incapable of dealing with the complexity of the real world, whereas others have argued that this is, in itself, a simplification (Macmillian, 1989b; Wilson, 1989). This is particularly the case now as a result of the ability of modern computers to process large amounts of data quickly. The accusation of simplification is, however, a reasonable criticism of the modelling used in the original HEA framework. It only models one threat at a time and considers the effects of the threat independently from other social variables and factors, including the proactive and reactive responses of households to threats generally.

Despite this, the type of modelling used by the HEA is useful for this thesis. Firstly, it is able to quantify the extent to which the Rama may experience food security as a result of the threats identified in the semi-structured interviews. Secondly, its use will aid the assessment of the suitability of the original HEA framework for a study of this type. Finally, the thesis will link the results of the modelling in chapter six to the responses of the Rama to food security threats that will be outlined in chapter eight, in order to capture the complexity that is not shown by the results of the model outputs.

The following section will discuss the rationale and limitations of using semi-structured interviews in this thesis.

### *3.2.6: Interviews*

The first method used in part two of the study's methodology was in-depth, semi-structured interviews. These were used to ask questions relating to areas of the HEA that were not included in the adapted surveys including the perceived threats to the Rama's food, the impacts of these threats and how the Rama cope with these impacts. They were also designed to encourage respondents to expand on the findings of the surveys and provide a more fine-grained analysis than is possible with the original HEA

framework. The open-ended questions used in the interviews were the most suitable method for investigating the research questions relating to individual perceptions and culture, people's beliefs and motivations, how they view the world, and how they make decisions (McLafferty, 2010; Guest, Namey and Mitchell, 2013).

Semi-structured interviews ensure the subjects relevant to the study objectives are covered, but also provide flexibility for the respondent to discuss relevant information that has not been introduced by the researcher (Willis, 2006; McLafferty 2010). An in-depth interview requires the researcher to “shape the probing questions in a dynamic fashion” and keep in mind the participant's previous answers (Guest, Namey and Mitchell, 2013: 113). This was achieved by only interviewing one person at a time (Guest, Namey and Mitchell, 2013). A provisional topic guide was developed prior to departure, but was updated and refined during data collection in order to interrogate the emerging findings from both the surveys and the interviews (this process is discussed in sub-section 3.4.2).

There are no rules about appropriate sample sizes for qualitative interviews (Guest, Namey and Mitchell, 2013). The selection of participants for the interviews was based on both convenience and random sampling. Initially random sampling was used based on trying to capture as many different types of households as possible, including ensuring that not only the most enthusiastic households – with their attendant characteristics – were included. Convenience sampling was also used later on when opportunities were taken to speak to respondents with whom I had a closer relationship or those who seemed more open to speaking to the research team.

It was initially intended to use key informants to help recruit respondents to the interviews, but instead respondents were recruited directly by the research team. This was because the chosen key informants were generally not involved in the data collection process and initially tried to restrict who participated in the project. This will be outlined in more detailed in Section 3.5 (below).

The key limitation of interviews is that there is always an unequal relationship between the researcher and the respondent and it is not possible for the researcher to be completely neutral throughout the process (Kobayashi, 1994; Barrett and Cason, 2010). This will be discussed further in sub-section 3.4.1 (below), which outlines the ethical



considerations of the study, and in sub-section 3.5.4 (below), which details considerations of the Rama's language.

The research diary, mentioned earlier in this sub-section, was used to record my personal thoughts, general observations, impressions and opinions to ensure I was able to reflexively analyse the qualitative data. All the data in the diary were coded alongside the data from the interviews (whether in transcripts or note form).

### *3.2.7: Other methods*

During the fieldwork collection period, observations were made and these were particularly valuable sources of information. This included observing the everyday lives of the Rama, including their food preparation and fishing and farming activities, and observing the buying and selling of goods that took place between the Rama and other Costeños in regional markets (mainly Bluefields). This was done to follow-up potential leads during the course of the research and to flesh out information from the interviews. Care was taken to check the accuracy of any assumptions made on the basis of observations by discussing them in interviews or in later informal conversations. These observations were recorded in the research diary that also recorded the research process and were coded alongside other recorded qualitative data.

Because of the importance of fish to the Rama diet it was essential to understand the varied price, quality and seasonal quantity of fish eaten in the community. Three individuals were shown a guide to the fish species of the Caribbean Coast (Cotto, 2001), and were asked to provide as much detail as possible about each. The results were used to supplement the research data and are shown in Appendix 3.

To have a better understanding of Rama customs, traditions and history, I conducted archive research in the libraries of the two Bluefields-based universities<sup>7</sup> and the Museo Histórico Cultural de la Costa Caribe. The two universities had standard, online catalogues that could be searched. At the Museo, I had to tell the staff what topics I was

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<sup>7</sup> The Bluefields Indian and Caribbean University (BICU) and the University of the Autonomous Regions of the Nicaraguan Caribbean Coast (URACCAN)

interested in and they then searched the archive by hand and presented me with resources that they thought were relevant.

At the end of the project, I conducted a feedback meeting with the three communities where I shared some preliminary findings with the respondents. As part of this, I conducted a brief focus group with some of the attendants in order to check the accuracy of the data collected during the household surveys.

### **3.3: Mixed methods**

As this study uses both qualitative and quantitative methods in a sequential and explanatory mixed-methods model, it is necessary to discuss the challenges and advantages of mixed-methods research and the importance of considering theoretical constraints when doing so.

There has been extensive debate about the compatibility of combining qualitative and quantitative research. This is because the dominant paradigm of each type of research – positivism for quantitative research and constructivism for qualitative research – are seen as conflicted (Johnson and Onwuegbuzie, 2004; Corbin and Strauss, 2008; Biesta, 2010; Feilzer, 2010; Silverman, 2011). Despite this, mixed methods studies have become increasingly accepted since the 1980s (Tashakkori and Teddlie, 2010; Creswell and Plano Clark, 2011). Tashakkori and Teddlie (2010) argue convincingly that the chief focus of research methodology should be on the research question rather than the worldview of the method used.

Mixed-methods studies present multiple advantages over non mixed-methods studies. They have the potential to address a greater variation of research objectives, produce stronger evidence and provide an understanding of the research topic that may otherwise be missed (Johnson and Onwuegbuzie, 2004; Plano Clark *et al.*, 2008; Teddlie and Tashakkori, 2009). Mixed methods can explore both important trends within large sample populations and explore individuals' perceptions and beliefs (Plano Clark *et al.*, 2008). Both of these are needed to achieve this research project's aims.

There are three philosophies on how to navigate the mixing of qualitative and quantitative research: a-paradigmatic, mixed paradigms and single paradigm (Hall, 2012). The a-paradigmatic philosophy asserts that only the data are qualitative or quantitative and they do not come linked to particular values (Biesta, 2010). I would argue that not using data collection and analysis philosophies and techniques that are appropriate to the data risks producing research knowledge that is not rigorous. The multiple paradigms philosophy is based on the premise that more than one paradigm can be used in a single study. Dialectics is the most often cited technique used in the multiple paradigms philosophy, but there is a paucity of research about its practicalities (Hall, 2012).

The single paradigm philosophy argues that research paradigms are not binary, but instead operate on a continuum with pure positivism at one end and pure constructivism at the other (Greene and Hall, 2010). Scholars have outlined a number of new single paradigms that sit along this continuum and provide a suitable basis in which to situate mixed methods research (Biesta, 2010). This research project will use the single paradigm technique of pragmatism, which is a form of the realism paradigm. This section will briefly describe these concepts and the impact they will have on this study.

### *3.3.1: Realism and pragmatism*

Realism is based on the principle that a generalisable ‘truth’ exists, but that it is experienced individually. It has been criticised for being too close to constructivism because it is ultimately based on the researcher’s own reality (Smith and Deemer, 2000). Pragmatism – a form of realism – addresses this criticism by instead focusing on the research objectives, with the paradigms and techniques chosen based on what is most appropriate for answering the research questions (Tashakkori and Teddlie, 2010; Johnson and Onwuegbuzie, 2004; Biesta, 2010). In this way it is close to the overall aim of mixed methods research which is “selecting and synergistically integrating” techniques from both qualitative and quantitative research in order to fit a research question (Tashakkori and Teddlie, 2010: 8). As previously established, research paradigms are not binary, but instead operate along a continuum. How pragmatism sits along this paradigm is outlined in Table 3.1 (below).

Table 3.1: The central assumptions of positivism, constructivism and pragmatism

	<b>Positivism</b>	<b>Pragmatism</b>	<b>Constructivism</b>
<b>Theory and Data</b>	Deduction – theory is tested by the data	Abduction – the researcher moves back and forth between the data and theory	Induction – theory is derived from the data
<b>Researcher’s Relationship</b>	Objectivity – there is only one truth	Inter-subjectivity – there is a single truth, but individuals experience it differently	Subjectivity – there are multiple realities
<b>Inference from Data</b>	Generality – findings can be extrapolated to other contexts	Transferability – investigates to what extent findings can be useful for other contexts	Context – research findings only apply to the context in which they were studied

Source: Adapted from Morgan (2007)

A criticism of pragmatism is that it is seen as a way to avoid engaging in discussions of research paradigms (Biesta, 2010; Maxwell and Mittapalli, 2010), but it represents a useful technique to conduct research that requires the use of qualitative and quantitative data. It is important, however, to outline how pragmatism worked in practice for this project and the impact it had on data analysis and interpretation.

### 3.3.2: *The practicalities of pragmatism*

As recommended by Plano Clark and colleagues (2008), the data collection and design of both the database and interviews were conducted in line with current best practice for each. The methods were used to inform one another with the survey findings contributing to the interview schedule (See Appendix 4) and the findings from the interviews being used to analyse the findings of the surveys. The HEA provided a useful framework through which to mix the empirical data.

As previously noted, elements of the HEA framework were included in the interview schedule – with data about the impact of threats to the Rama’s food as well as the ways the Rama cope and respond to these threats coming from qualitative methods. The analysis of both data sources focused on producing findings that had utility for

answering the research questions. The third results chapter (chapter six) – which shows how the identified threats could have an impact on these baseline data – draw extensively on quantitative data so it is arranged similarly to a quantitative-style results chapter. The other results chapters (chapters four, five, seven and eight) draw predominantly on qualitative data so they are generally arranged around the theoretical frameworks devised through the Applied Thematic Analysis method (see sub-section 3.6.2, below).

The quantitative data is embedded within a larger qualitative research design, with greater weighting given to the qualitative element, but the quantitative data was collected before the qualitative data in a sequence. The study is, therefore, an embedded, unequally-weighted, sequentially-timed mixed-methods study (Plano Clark *et al.*, 2008).

### **3.4: Ethical approval and considerations**

This section of the chapter will briefly outline the process of ethical approval and then detail the ethical considerations of the project.

#### *3.4.1: Ethical approval*

Nicaragua does not have a formal research approval process according to Nicaraguan Government websites. Ethical approval was instead sought from the Rama territorial government (GTR-K) and this will be detailed in the following section (Section 3.5) of this chapter. Ethical approval was also sought from the UCL Ethics Committee and was granted on 18 November, 2015. The fieldwork data was held in compliance with the UK Data Protection Act (1998).

#### *3.4.2: Ethical considerations*

There are a number of ethical considerations for this project, three of which were considered prior to the study's commencement. Firstly, there was a multi-layered

contrast between my position as a white, male Western researcher and the Indigenous respondents, many of who were female.

The predominance of Western ideas and paradigms in research puts non-Western respondents at a disadvantage and creates a hierarchy of power between the researcher and the researched (Smith, 1999). This research needed to be compatible with the established principles of conducting research with indigenous peoples and the provisions of ILO169<sup>8</sup> and I took a number of steps to guarantee this, including ensuring that free, prior and informed consent (FPIC) was gained (see below), that the Rama benefitted from the study and that I treated research contact as a conversation not an extractive process (Wilson, Hendricks and Smithies, 2001; AIATSIS, 2012; DeLeeuw, 2012; Jamieson *et al.*, 2012). Further details about these steps are included in the remainder of this section of the chapter.

As a male researcher, I also had to consider the imbalance that existed between the female respondents and myself. As recommended by the UCL Ethics Committee and the research panel that oversaw my upgrade from MPhil to PhD status, I planned to recruit a female, Rama research assistant to help manage this inequality. This was so they could help to explain local cultural values or language use that I may otherwise miss. As mentioned, the research team consisted of a research assistant and myself. Two different people held the role of research assistant, but most of the time the role was held by one individual who will herein be referred to as the principle research assistant. The principle research assistant was Creole rather than Rama, but she was recruited because of her experience working on research projects with different ethnic groups on the Caribbean Coast. Overall her status as a non-Rama individual was an advantage for the conduct of the project and this will be explained in Section 3.5 (below).

I was aware that I might be exposed to difficult political situations dependent on the relationships and power imbalances that exist within the community. I aimed to be aware of local practices, customs and political roles to ensure I did not cause offence. I discussed my research plans with, and sought cultural guidance from, researchers who have conducted similar projects, local NGOs and contacts, and my research assistants. During data collection, I was careful to allow respondents to speak about what they

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<sup>8</sup> The Indigenous and Tribal Peoples Convention (1989). A convention of the International Labour Organisation guaranteeing the rights of indigenous peoples

wanted to talk about as much as possible, to not interrupt them and to not impose my own personal views on them. Everybody within the research team did not always adhere this to principle and this will be outlined briefly in Section 3.5 (below).

The second ethical concern considered prior to data collection was ensuring that participation in the project did no harm to respondents. It was envisioned that discussing food – which can be a very personal subject – might lead to the discussion of sensitive information. During the process of data collection, it also became clear that the internal politics of the Rama (and the entire Caribbean Coast) was very sensitive and this strengthened the importance of confidentiality for the respondents. Because of this, respondents were only allowed to take part if they had given free, prior and informed consent (FPIC).

FPIC requires that respondents understand the aims of the project and what is required of them before the project begins (AIATSI, 2012). The benefit to the participants and the intended outcomes and dissemination of the research outputs should also be understood and agreed upon. Respondents were told they did not have to answer any question they did not want to, that they could withdraw from the study at any time, and that all data was anonymous so they could not be identified as a result of any future publications. All of the above information was shared at the project information meetings and repeated to the respondents who were not present at the meeting before they were recruited into the study.

The informed consent sheets were written in Spanish because although there are similarities between Rama Creole and English, most Rama learn to read in Spanish. If a participant was unable to read, I read the information sheet and consent form to them. Although this meant I was available to answer any questions or concerns they had about the project and its purpose, these respondents may have felt under more pressure to participate. This doesn't appear to be the case, however, as those who chose not to participate in the study did not participate in the project information meetings and were instead approached directly.

The final ethical consideration identified prior to commencing data collection was ensuring that respondents benefitted from the study. The primary way in which this was achieved was through communicating the results of the project to the participants. As

mentioned in sub-section 3.2.4, a post-data collection meeting was held to share the preliminary results with the community and this was designed in line with other researchers who have conducted research projects in the area (Mitchell, Steeves and Hauck Perez, 2015). Respondents were invited to comment on the findings and share their thoughts in the focus group that followed. Secondly, after the completion of the PhD, I will also produce a short summary of the project's findings for the Rama Cultural House (a collection held on Rama Cay), the GTR-K, key informants, and the libraries of the two Bluefields-based universities and the Museo Histórico Cultural de la Costa Caribe. Doing this might allow local stakeholders and community members the opportunity to discuss the findings and find appropriate solutions or strategies for the issues raised by this project. It is hoped that through subsequent publications, the research will raise awareness, both within Nicaragua and globally, about the Rama and the issues they face. As mentioned in chapter one, there is a paucity of research and information about the Rama and this study could contribute towards a greater understanding of how the policies of the Nicaraguan Government and NGOs might be useful to them.

It was clear that some form of compensation for participating in the project was both appropriate and expected. At the project information and feedback meetings, I provided refreshments such as drinks, biscuits and fruit. A local NGO gave me food packs produced by a US-based charity<sup>9</sup> to be distributed at these meetings in all the communities, though it is likely these would have been distributed to the Rama communities even without my project. Most Rama on Rama Cay would also not have connected me to the packs because the community leaders distributed them. I gave some of these food packs directly to families in Tik Tik Kaanu. I also gave a gift of meat to the household whose home I stayed in when conducting the data collection in Sumu Kaat, which they requested.

I gave small gifts to the families who did the dietary surveys, as they were the most frequent participants in the study. When I interviewed people in Bluefields, I bought them food and/or a drink as a gift because, to a certain extent, they had to fit their availability around my schedule rather than the other way around. I also provided food

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<sup>9</sup> The NGO was called Feed My Starving Children. This caused much amusement and irritation for some Rama. One commented jovially that “our children [are] not starving”. The food packs contained rice and quorn mince (called “poo meat” by some Rama because of the smell) that were pre-packaged in the US and usually distributed by local NGOs.



packs to attendants of the feedback meetings and to families who had been the most involved in the study. Finally, I provided lifts to some Rama individuals to and from Bluefields, but this was not connected to their participation in the project. Instead it was purely due to convenience as there was space in the boat I had chartered. A positive, but not necessarily intended result of this was that I had more opportunities to talk to the Rama informally. Further ethical issues that arose during the data collection period will be outlined in the following section of this chapter.

### **3.5: Data Collection**

This section of the chapter will describe the process of data collection for the project. It will first describe how approval for the study was gained from the Rama leadership and the logistics of conducting the fieldwork in the three communities. It will then describe how the household and dietary survey data were collected before outlining how the interviews and observations were conducted.

#### *3.5.1: Approval and logistics*

As mentioned, project approval was first sought from the Rama territorial government (GTR-K). I arranged a meeting with the GTR-K (21.01.2016) and presented the project aims, objectives, survey outlines, interview schedule, ethical approval forms from UCL and the project information sheets for participants to the president and the council. I also gave a short oral presentation about my background and the overall intention of the project. Approval was provisionally granted in the meeting itself and confirmed by telephone conversation the following morning. I was given the name of two contacts on Rama Cay who could act as the initial key informants.

I travelled to Rama Cay that Friday afternoon (22.01.16) and made contact with one of these key informants. I presented my project to this individual and arranged to give a project information meeting to the community on the following Monday (25.01.16). I was asked to provide refreshments and the key informant agreed to invite the entire community. I also conducted a survey with the key informant and asked a number of

questions about the community in an extended, informal interview. The survey was revised to make it quicker to administer.

Forty-seven members of the community attended the project information meeting. Some of the attendees had concerns and these can be summarised in two themes. The first concern was that I was connected to the Nicaraguan government, an NGO or other political group or private concern. It was noted that individuals may give different responses because of their understanding of my research, as outlined by a scholar quoted in Barrett and Cason (2010: 110): “[I]f informants thought we were somehow there to ‘judge’ their eating habits, they would tend to exaggerate the data to make it seem as if they were consuming all the things that are supposed to be good for you... On the other hand, if they thought we were there for a handout, they would under-report”. It was stressed, therefore, that I was an independent researcher and I also repeated the funding background and aim of the project that I had already presented. The second concern was that when previous researchers had conducted extractive research projects, they had collected the data they required and then not informed the Rama about their findings. I responded by reiterating that the project’s ethical approval required me to conduct feedback meetings with the Rama community to disseminate my research findings and that I was keen to do this. I also restated that I would be sharing the final thesis with local libraries and organisations.

No project information meeting took place in Tik Tik Kaanu. One of the community’s leaders initially recommended a particular day when I could do it, but there was a community meeting taking place on the same day. Because of the time constraints of the project at this point – immediately prior to the Easter break – and with the assent of the leaders of the community, it was decided to conduct the informal consent process with each individual family when they became available. For each of the 16 households, the leader of the community accompanied me to the house and explained who I was. I then described the project and allowed the informants read the project information sheet and consent form. As mentioned, it is possible that this process put extra pressure on the respondents who felt they had to participate as I was present during the decision-making process. However, the community was very open to the research team’s presence and the community leader had explained about the research project in the community meeting, so it was not the first time they became aware of it.

In Sumu Kaat, a project information meeting was arranged prior to data collection (10.05.16). There were 23 attendants and it followed the same format as the meeting on Rama Cay. There were no questions asked in the project information meeting in Sumu Kaat. It is possible this was due to the gender dynamics of the meeting—all of the meeting attendees were women and myself, an NGO worker with whom I travelled to the community, and the three key informants I relied on were all men. I did not have a research assistant during this trip as neither of the assistants I had previously worked with were available. The importance of this dynamic will be explained further in subsection 3.5.4 (below).

Data collection on Rama Cay commenced on the same day as the project information meeting, focusing first on the teachers in the community as they were less likely to be available once the school term commenced at the end of January. This did not mean the data concerning teachers is seasonally biased, however, as there were teachers in two of the families I continued working with through the data collection period. A number of households that were visited on Rama Cay said they had not been invited to the meeting and said they believed they had been excluded deliberately. In these cases, I apologised to the families, explained about the project and conducted the informed consent process. All were happy and keen to participate after this.

Based on this incident and other comments from the key informants I contacted on Rama Cay, I inferred that they did not want me to talk to certain families. I reiterated to the key informants that my sampling strategy was to conduct household surveys with all Rama families living on Rama Cay. Sticking to this sampling strategy for the household surveys meant I was more able to build relationships with Rama who followed different livelihood strategies and who had different relationships with the Rama leadership. Subsequently, I was able to conduct dietary surveys and obtain interviews with a more representative group of respondents. My reading of the situation was that these attempts by the key informants on Rama Cay to control who I spoke to was evidence of the division within the Rama community that became evident during the data collection period. This will be discussed more in the results section of this thesis.

During the fieldwork period for both the surveys and the interviews, trips were made to one of the three communities between two and four times a week. The number of trips each week was dependent on the availability of the research assistant, illness, logistics,

research budget and other interruptions including public holidays. No visits were made to any of the communities between 18.03.16 and 18.04.16 due to a combination of conference commitments and the availability of research assistance.

### 3.5.2: Household surveys

A total of 83 households were surveyed on Rama Cay between 22 January 2016 and 24 February 2016. In Tik Tik Kaanu, 16 households were surveyed between 16.03.16 18.03.16. In Sumu Kaat 11 households were surveyed between 10.05.16 and 11.05.16. Therefore, a total of 110 households over the three communities were surveyed, representing a total of 707 Rama people (based on the information given by the heads of the households). There are no official population statistics for the Rama, but based on the assertion in GTR-K (2007), this would represent >45% of the total Rama population. Within just the three communities that this project focused on, there were only three refusals to participate and families who were not initially available were revisited until they were (with the exception of two families in Sumu Kaat). It is reasonable to suggest that this represents a response rate greater than 95% within the three communities. The study's sample size and its representivity of the total Rama population is presented in Table 3.2 (below).

Table 3.2: Study sample size and representivity of the total Rama population

		<b>Rama Cay</b>	<b>Tik Tik Kaanu</b>	<b>Sumu Kaat</b>	<b>Totals</b>	<b>% of c. 1,500 population</b>
<b>Project Information Meeting Attendees</b>		47	N/A	23	70	4.7
<b>Household Surveys</b>	Households	83	16	11	110	47.1
	Individuals	548	93	66	707	47.1
<b>Dietary Surveys</b>	Households	9	N/A	N/A	9	5.7
	Individuals	86	N/A	N/A	86	5.7
<b>Informal Interviews</b>		65	15	11	91	6.1
<b>Formal Interviews</b>		36	4	3	41	2.4

Source: Author

Household survey data were collected on paper printouts of the survey and these were entered into Microsoft Excel<sup>10</sup> spreadsheets on the same evening the data were collected. At the end of each week of data collection, an assistant checked the data in the Excel spreadsheets against the originals to ensure they had been entered correctly. The amount of time taken to administer the survey for each household varied from as little as five minutes to more than two-and-a-half hours. The reason for this is because during the course of conducting the surveys, many of the respondents talked about themes that were not directly related to the questions asked in the survey or could not be easily entered into the survey format. In many instances, I asked follow-up questions and if it was clear that a respondent was open to longer questioning, I would often refer to the interview schedule. As might be expected from the amount of time spent conducting surveys and then informal interviews in this way, these qualitative data contain a wealth of information about the research topic. These responses were handwritten onto the paper survey printouts and later typed-up into the survey Excel files when the survey data were digitised. In total, qualitative data of this type was collected from 91 respondents: 65 of these were from Rama Cay, 15 were from Tik Tik Kaanu and the remaining 11 were from Sumu Kaat. Thus, all of the Sumu Kaat respondents gave additional information in this way. These data were coded alongside the data from the observations and semi-structured interviews.

One of the issues of the sampling strategy used was that it relied on the Rama to include who they considered to be in their family. Some households that were visited said their family was only those who lived in their own house – their nuclear family – and that we should also speak to the respondent’s mother, aunt or sibling. In contrast, other households visited included their extended families, even if they lived in different homes. To try and combat this, respondents were asked which people ate with them on a daily basis and so the (household-based) unit of analysis shifted from the concept of a ‘family’, which had multiple interpretations, to the concept of a ‘kitchen’—all the people who the respondent regularly ate with, regardless of whether or not they usually slept in the same dwelling as them. This was an appropriate unit of analysis for a study about food, but it was an unusual concept for most respondents. It took longer to collect the demographic data for each ‘kitchen’ and it may have led to errors, but it meant that these data could be compared with others in similar contexts such as that collected on the Mayanga indigenous group by Dr Jeremy Koster.

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<sup>10</sup> Microsoft Corp. (2010) Microsoft Excel, Version 14.7.2

Four families on Rama Cay were missed in the initial period of household survey collection and visited later on after subsequent conversations revealed this had happened. This had occurred because a respondent interviewed had said the members of these four households always ate with them, but subsequently the members of these households said they usually did not. It was clear when looking at the data that the respondents who had initially included the members of these families as being part of their 'kitchen' had not said they ate an amount of food that would have been sufficient for everyone they named. In each case, I surveyed the 'new' family and then returned to the original family and asked them to restate the family members that regularly ate with them. This ensured that it was correct to consider these new families to be separate from the original family.

It is possible that other households on Rama Cay were missed. Two families (kitchens) were not surveyed in Sumu Kaat, because the houses where they lived were always empty when the key informants and I went past. It is presumed that all families in Tik Tik Kaanu were included in the study.

### *3.5.3: Dietary surveys*

The dietary surveys were conducted with nine families living on Rama Cay between 18.02.16 and 16.03.16. The dietary surveys were collected because of the ambiguities that emerged in the household survey data that were outlined in Section 3.2 (above). The principle difference between the household surveys and the dietary surveys is that in the former, respondents were asked what they normally ate, whereas in the latter, respondents were asked about the specific meals they had on a daily basis. The dietary surveys were designed to supplement the household survey data and provide a better basis for modelling the potential impact on the Rama's food of food security threats highlighted by the Rama. The food security threats will be outlined in chapter five and their impact will be outlined in chapters six and seven. This section will describe the process of data collection of these dietary surveys.

Twelve families were selected to cover a range of wealth and livelihood strategies, as well as other factors including their physical location on the island, relationship to the community leaders and attendance at the project meeting. Two families chose not to

take part. A few days were lost to a local baseball tournament that took place close to the island and was widely attended by the Rama. Two trips to the baseball field were made, but yielded no data as participants were engrossed in the games and did not want to participate. These trips did, however, enable me to connect with two individuals for interviews and to conduct observations.

Two families on the north of the island were frequently busy or unavailable (not on the island at the time of data collection). This meant their data is likely to be less reliable than others who were always recalling meals that were eaten on the day, or the day before they were interviewed. One family included a female respondent who had recently decided to return from receiving cancer treatment in a hospital in Managua and cease chemotherapy treatment to be with her family. Early on in the data collection period, her general level of discomfort and difficulty responding became increasingly more apparent. It was decided that data should no longer be collected from the family for ethical reasons, although two visits were made to the home to check on her condition. Shortly before the data collection period ended, the unwell respondent was admitted to Bluefields Hospital, confirming that it was the right decision to discontinue data collection. When I returned to the island in April after a break of one month, I learned she had sadly passed away. The family was invited to, and attended the feedback meeting.

The key limitation of the dietary surveys was that the data collection period was limited to just one month. As mentioned previously, there are large seasonal fluctuations in the type of food eaten by the Rama and sometimes in the livelihoods the Rama follow. These will not have been captured by the dietary surveys. Equally, the research team was not able to travel to the island every day because of budget and logistical limitations, so families were often asked about what they had eaten on previous days, which meant there was a risk of recall bias.

#### *3.5.4: Interviews*

A total of 41 semi-structured, informal interviews were conducted between 29.02.16 and 09.06.16. Of these, 36 were conducted with Rama Cay residents, four were conducted with Tik Tik Kaanu residents and three were conducted with Sumu Kaat

residents. Six interviews were conducted in Bluefields rather than in the Rama communities. Three of these were with residents of Rama Cay, two were with residents of Sumu Kaat and one was with a Tik Tik Kaanu resident. As previously stated, data also come from interviews that were conducted during the household surveys and data from these two types of interviews were analysed alongside each other.

#### *3.5.4.1: Sampling*

The sample was selected purposively in some cases and through convenience sampling in others. This was done to capture as much diversity in the sample as possible and to take advantage of when respondents were available. Some respondents were formally recruited and appointments were made whereas other interviews were more informal, developing from informal conversations I had with the respondent. This latter type of recruitment to the interviews was greatly facilitated by the relationships that I developed during the time spent in the communities.

#### *3.5.4.2: Facilitation and translation*

The Rama speak Rama Creole as their first language and some speak Rama and/or Spanish as a second language. As noted in sub-section 3.4.2, even when a researcher speaks the same language as their study's participants, there is a hierarchy of power between the researcher and the researched (Smith, 1999). As part of an attempt to manage this inequality, I recruited a Creole-speaking, female research assistant. Dr Emma Mitchell, who has conducted similar research with Nicaraguan Creole speakers, recommended the research assistant to me.

Rama Creole has many similarities with Standard English, but a few could not understand my English or believed I could not understand them. This was often because of just one word that was being used. For example, to the Rama, a question such as, "Which of these is more important to your livelihood?" would appear to them as, "Which of these is more important to your [unknown word]?" I was able to understand all the respondents because the Rama Creole equivalents of Standard English words were usually an archaic, or infrequently used, Standard English word, or a word that has



its roots in Spanish. For example, some Rama respondents would ask me “What time did you reach?” I was able to understand immediately that this question was the same as, “What time did you arrive?” from the context and because both words use the same verb (llegar) in most contexts in Spanish. A few examples of semantic differences between Rama Creole and Standard English are given in Table 3.3 (below).

Table 3.3: Differences in vocabulary between Rama Creole and Standard English

<b>Rama Creole word</b>	<b>Most commonly-used Standard English equivalent</b>
Plantation	Farm
Uno	You/You all/One
Plenty	The most
We	Us
Carry	Take
Mash up	Destroyed
Reap	Harvest
Chamba	Informal/side job
Reach	Arrive
Plant back	Replant

Source: Author

The research assistant was usually able to smooth over any difficulties in understanding when this was the case. When translation was needed, however, the research assistant framed the interpretation and understanding of the interview (Bujra, 2006), and occasionally disrupted their intended two-way nature (Guest, Namey and Mitchell, 2013). This was both an advantage and a disadvantage in some contexts.

Initially I was quite reliant on the principle research assistants’ understanding of the local customs and she was very effective at recruiting possible respondents. On occasions during the interviews themselves, this local knowledge meant the research assistant sometimes imposed her own views into the interview space. Although this often led to further areas for inquiry it is worth noting that the most overtly political responses to interview questions took place when the research assistant was not present. This may suggest that respondents felt more comfortable talking about some issues when they felt the research assistant would not challenge their views.

Later on during the data collection, I had a better understanding of Rama Creole and was able to conduct most interviews without any assistance. A number of interviews

were conducted mainly in Spanish, either because the participants felt more comfortable conversing in Spanish, or because they could not understand my English and the research assistant was unavailable. In these instances the interviews were translated into English and then back translated in Spanish in accordance with best practice (Mitchell, Steeves, and Hauck Perez, 2015).

In relation to transcription (detailed further in 3.6.2.2), Rama-Creole has no standard written form so I aimed to reflect the patterns and idiosyncracies of the speech of the Rama speaking Rama-Creole. In the interests of making them understandable to readers, I have written the quotes included in this thesis in Standard English. Although I am aware that standardising non-standard linguistic forms is a “political act” (Bucholtz, 2000), it follows the process used by Mitchell and colleagues (2015) whose research participants spoke Caribbean Coast Creole, which is very similar to Rama-Creole.

Where possible, the interviews were recorded to ensure the natural flow of the interview and the rapport I built with the interviewee was not disrupted by note taking. It also enabled me to focus fully on the interaction and observe non-verbal communication and clues (Longhurst, 2010), which I later recorded in a research diary (see below). Most interviews took place in the Rama communities, but others took place in Bluefields, either at the wharf where boats left to go to the communities, or in offices and cafes, or at the central market in the town centre.

Unfortunately, the research assistant was only able to transcribe five of the 21 transcripts because another project she was working on was demanding much of her time. Despite this, it was a useful process for triangulating the data. The interviews that were transcribed by both of us had many variations, for example in spellings and emphasis. Through this process some different spellings of local words were adopted (because of the assistant’s superior local knowledge), and some alternative interpretations that were noted greatly improved the analysis.

In terms of my own reflexivity, I tried to be as neutral as possible in my questions during the interviews. I allowed respondents the space to talk about what they wanted to talk about, even if I felt it was not connected to the research objectives. Deciding what question to ask next, or which part of a respondent’s answer to pursue with a follow-up question, however, was influenced by some of my early interests. My focus on some

areas may have meant others were not covered in as much detail. For example, I tended to ask more questions about the leadership than I might otherwise have done. I also tended to pursue areas that were helpful to the research project's objectives more vigorously than those the respondents wanted to talk about.

Twenty-one of the 41 interviews were recorded using a dictaphone. The other 20 interviews were not recorded for a number of reasons, including the respondents requesting not to be recorded, or because the location where the respondent requested they be interviewed was too noisy. For the interviews that were not recorded, I took contemporaneous notes.

### **3.6 Data analysis**

This section of the chapter will outline how the data were analysed. It will first describe the quantitative analysis of the household and dietary surveys, and then the qualitative analysis of the interviews and observations.

#### *3.6.1: Surveys*

The data from both survey types were cleaned to ensure items were spelt and recorded the same. A tenth of the household surveys (n=11), and two days of data from each of the families who participated with the dietary surveys, were checked again to ensure they had been entered correctly from the paper originals.

##### *3.6.1.1: Wealth and income data*

The analysis of the wealth scale (part S2 of the household surveys) was based on the work of Henrich (1997) who calculated a composite score for each household based on the market values of each items. A limitation with any score based on possession of certain items is that some of those items might be gifts or acquired at significant discounts or illegally (Lu, 2007). Equally, owning these items does not mean they are

working or the owner can afford to run them. For example, in Sumu Kaat one respondent owned a boat and a motor, but he did not have enough money to buy fuel.

The monthly income of each family was calculated by formulas embedded in each Excel sheet that took data from their stated income earned through employment and the selling of produce or other items. The main characteristic of these data, however, is the large amount of households who either withheld this information or said they were unsure about it. This causes problems with any sort of interpretation because the impact of threats that affect income cannot be modelled for these families and it may also have affected the average and/or range of these data.

### 3.6.1.2: Calorie data

For each food item mentioned in the surveys, calorie amounts based on generally given weights or measures were ascribed. These calorie values were based primarily on the McCance-Widdowson Composition of Foods Integrated Dataset (Roe *et al.*, 2015). This dataset lists calorie values for food items, taking into account how they are cooked or prepared. The dataset is designed to cover foods that are available in the UK, but includes most food items that are eaten by the Rama, in part through its integration of the food composition tables compiled by the Caribbean Food and Nutrition Institute, (1974). There are some foods eaten by the Rama that are not included in this database; notably the meat of animals not usually found in the UK such as waori and iguanas. For these items, the calorie values outlined in Alvard (1993) and Hill and Hawkes (1983)<sup>11</sup> were used, and for other items approximations based on online resources were made<sup>12</sup>. Observations, interview data and Grinevald and colleagues (2012) were used to determine the normal cooking methods of the food items recorded in the surveys. When the amount eaten of a particular food item was not a weight or other recognisable measure, its calorie value was estimated based on observational or interview data. For example, the Rama quite often referred to ‘buckets’ of oysters, but it was known from interviews that a bucket was equivalent to four quarts.

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<sup>11</sup> These sources collectively assume that there are 1,950kcal/kg of edible flesh in most meats and 1,000kcal/kg of iguana flesh (which is presumed to be the same as a snake)

<sup>12</sup> The calculators used were NHS LiveWell, CalorieControl.org and NutraCheck.co.uk

Once these calorie values were ascribed to each food item, the number of calories each family was eating daily could be determined. For example, boiled beans contain 621 kcals per pound (lb), so if a family said they eat 2lbs of boiled beans every day, they consume 1,242 calories from this food item. Formulas embedded in Excel sheets were then used to calculate the percentage of each family’s total calorie intake from each of the specified sources: Bought, Purchased, Wild and Gift. A worked example is shown in Table 3.4 (below).

Table 3.4: Worked example of a calorie calculation\*

Item	Weight (lbs)	Weight (Other)	Source	Frequency	Calories Per Unit	Contribution
Rice	1		B	Daily	658	658
Beans	0.5		P	Daily	621	310.5
Beans	2		B	Daily	621	1,242
Fish	0.5		W	Daily	549	274.5
<b>Total</b>						2485

Source: Author

*\*From this example, it can be seen that this family ate a total of 2485 calories/day, with 1900 calories coming from food they had bought (76%), 310.5 calories coming from food they produced (12.5%) and 274.5 calories coming from wild sources (11.5%).*

Missing data caused some issues with these calculations because calorie values for each food item, the type of food, the amount of food and the frequency that it is eaten all need to be recorded.

The calorie requirement for each family was calculated based on the demographic data given by the survey respondents about their own household (kitchen) and average recommended calorie intakes based on WFP/UNHCR<sup>13</sup> guidelines (WFP/UNHCR, 1997). Children under two years old were excluded from the calculation<sup>14</sup>. This approximation of calorie requirements for each family therefore did not take into account differences in genetics, activity levels, variance within age groups, or variance in the numbers of household members eating due to absences or the presence of guests.

In reality there is a potentially large variance within each of these separate calculations. Firstly, although a number of samples were used to arrive at the calorie values given by

<sup>13</sup> World Food Program/United Nations High Commissioner for Refugees

<sup>14</sup> In Nicaragua, 42.9 percent of children are still breastfed until 2 years of age (Unicef, 2017) and observations suggested this was much higher amongst the Rama (Personal Observation, 2016)

the McCance-Widdowson dataset, Finglas and colleagues (2015: 7) caution that “due to the large variability of foods, it is unlikely that a particular item will have precisely the same composition as given in [the dataset]”. Secondly, although great care was taken to ensure that all the different cooking methods used by the Rama were understood and average calorie values were ascribed to all food items, this still does not mean this variance is included in the calculation for each family. For example, the calorie value for fish was based on an average between boiling and frying fish. This means that if one family always boil their fish and another always fries their fish, this calorie value will be inaccurate for both.

Thirdly, some individuals were guessing at the amount of food they ate. This was generally more prevalent amongst families who sourced more of their calories wild or from their own production than those who bought the majority of their food. This is probably because food is bought by weight, so a respondent will be more likely to remember the exact weight they ate. In contrast those respondents eating wild food or food from their own production are less likely to weigh it out before consuming it. Families who did not know the exact weights tended to respond with phrases like, “there are six of us so we have six fish”. As mentioned above, ascribing weights (and therefore calorie values) to responses like this were based on interview and observation data, but errors are more likely in these instances.

### *3.6.1.3: Statistical analysis of household surveys*

Analysis of the household survey data was achieved primarily through the production of appropriate descriptive statistics with significance set at the five percent level. The tests used are described, where required, in the results section of the thesis. Data analysis was facilitated through the use of SPSS Version 22<sup>15</sup>. As mentioned previously, the results of the surveys were also used to inform, and contribute towards the analysis of the interviews.

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<sup>15</sup> IBM Corp. (2013) IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

#### *3.6.1.4: Analysis of the dietary recall surveys*

The dietary recall surveys were used to model the impact of certain weather events on the food of four selected families based on the method of percentage calculations used by the original HEA framework. The results from this analysis are outlined in chapter six of the thesis.

#### *3.6.2: Analysis of the interviews and observations*

Analysis is not a discrete stage of the process in qualitative research because the researcher should move backwards and forwards between analysis and further data collection to test theory (Pope, Ziebland and Mays, 2006). Moreover, the researcher engages with the data throughout the collection process by asking clarification questions that reflect the researcher's understanding back to the participants (Secor, 2010). Thus, the interview analysis – and the inclusion of new questions into the interview schedule as a result of initial findings – took place while the data collection was in progress and transcription of the recorded interviews was taking place. For the purposes of this chapter, however, this section will describe the analysis process in a more linear fashion. It will describe the transcription of the interviews and the reviewing of the notes from non-recorded interviews and observations, and the coding and development of categories and themes (both described in this sub-section). Firstly, however, it will explain Applied Thematic Analysis, which was the technique used by this project for qualitative analysis.

##### *3.6.2.1: Applied Thematic Analysis*

Applied Thematic Analysis was chosen because it is designed to complement mixed-methods research and answer research questions of a practical nature, with analysis relying on the development of themes directly related to the research question (Guest, MacQueen and Namey, 2012). Using Applied Thematic Analysis means the codes developed from the interview transcripts are chosen to represent themes imposed by the focus of the study, its research questions and context, and the theoretical framework within which the study is conducted (Guest, MacQueen and Namey, 2012). It was

appropriate for the analysis of data that was split into clear themes of enquiry through the HEA. The thematic approach greatly facilitated the HEA's four distinct stages—the sourcing of food, the threats to that food, the impact of climate shocks and the adaptation responses of the study population. Applied thematic analysis draws on techniques from a variety of qualitative methods including grounded theory and phenomenology (Guest, MacQueen and Namey, 2012). This was particularly useful as it allowed elements from different techniques to be used where appropriate. A variety of coding techniques were used and this will be explained (below).

### *3.6.2.2: Transcription and note reviewing*

After each interview, the tape was transcribed if it had been recorded, and/or the interview notes were reviewed and typed up. Emerging themes were noted during this process and the notes that were taken were used to develop new questions or lines of query to be added to the interview schedule.

An audio recording is not a direct reflection of the interview, however, because it is unable to effectively display emotion or non-verbal communication (Poland, 1995). I was careful, therefore, to note important impressions that I had about each interview in the research diary as soon as possible after it had finished. Similarly, transcriptions and notes are translations of the interview (Davidson, 2009), and they are bound with power relations as they reflect what the interviewer think was said or implied (Slembrouck, 2007). As mentioned previously, my preferred method for transcription and note taking was for both the research assistant and I to transcribe the interviews and compare our results. Although the research assistant was only able to transcribe five of the 21 transcripts, this process was useful for triangulating the data and for ensuring that local spellings of words were adopted.

For my transcripts, I erred towards “denaturalism” by largely excluding nonverbal and involuntary vocalisations, but including pauses and stutters (Oliver, Serovich and Mason, 2005). This was done because I was interested in what the respondents said about food, rather than interpreting what these subtle vocalisations said about the respondents themselves (Cameron, 2001). As shown in Bucholtz (2000), however, the impact of not transcribing certain utterances in transcripts can have real-world



consequences for the interpretation of conversations. For this reason, each recording was listened to at least two times to ensure important elements had not been omitted. When quotes are included in this thesis, in addition to them being written in Standard English as previously mentioned, some changes were made to provide context that could not be included without resorting to including extensive passages from the transcripts.

In terms of comparison between interviews that were transcribed and those that were recorded in shorthand note form, in the two instances when both notes and recordings were taken, there was a similar emphasis between the coding of the transcripts and the contemporaneous notes that were taken. Direct quotations were only taken from transcribed interviews, however, regardless of the presumed accuracy of the notes.

As stated above, the process of writing up the interview notes and transcribing the recordings commenced while data was being collected. I kept a note of any analytic memos and preliminary codes that resulted from these interactions with the data as recommended by Saldaña (2016). These notes formed extensive pre-coding analytic memos, which were also treated as data through later stages of the analysis and greatly informed the direction in which first coding developed as well as the creation of codes, categories and themes.

At all times throughout the process of data collection and analysis, the research aims and objectives were continually referred back to, as recommended by Auerbach and Silverstein (2003). The pragmatic paradigm in which the study was based helped dictate this process as each provisional code, category and theme identified was tested for its importance by checking what influence it would have on an understanding of the project's objectives. The themes were then referred back to the data and revised through a process of renegotiating the classification and interpretation of the codes.

### *3.6.2.3: Development of codes, categories and themes*

The first part of this process was to ensure I had immersed myself in the data. This was achieved by reading through the transcripts or interview notes and the previously written analytic memos, and listening to the interview tapes a number of times. This

process also allowed me to identify particular areas of interest in the data that should be pursued. My own beliefs and understandings shaped what was important to pick-out through this process and to subsequently code.

The next stage was to begin applying open codes – short summarising words and phrases – to sentences and key words in the text. Although there was also an element of convenience based on when certain notes and transcripts were available, I tried to ensure that each data source I coded on contrasted in some way with the others I had coded before, as recommended by (Bazeley, 2003). This was done to create a greater chance of a variety of concepts being coded in early-stage analysis and therefore subsequently interrogated in the interviews.

A concept for each code was created by asking questions around the meaning of the text it related to and noting these alongside the initial open codes. These concepts were developed through querying how important each code was in relation to the overall research question and checking my interpretation of previous codes against new codes. The principles of Applied Thematic Analysis state there is little to be gained from pursuing themes that are not relevant to the research question (Guest, Namey and Mitchell, 2012).

The coding used was eclectic, drawing on different qualitative traditions where appropriate. For example, the data presented in chapter seven was based on comparing and contrasting responses from different families in a more inductive way with data analysis conducted through bottom-up, line-by-line coding. In contrast, for the data presented in chapter five on the threats to the food of the Rama, coding was more top-down with many of the themes imposed from the literature. I did, however, also use ‘in-vivo’ codes in this instance to ensure a more vivid and respondent-focused analysis and to retain as much of the original sense of the data as possible (Boyatzis, 1998).

The coded data were collected into an Excel document to allow easier manipulation. Each code could be organised into common categories and general themes, which could then be reapplied back to the relevant part of the qualitative data and used to interrogate the codes applied in the initial coding process.

### **3.7: Summary**

This chapter has described the methodology used for this research project and explained why it was appropriate for this study. It has explained how and why the original HEA framework was adapted into surveys, interviews and observations in a sequential and explanatory mixed-methods study.

The first section of the chapter focused on the Household Economy Analysis (HEA), as this was the starting point for the methodology and was adapted for the project. It outlined the history of the HEA, and presented its five separate stages: Baseline, Problem Specification, Impact, Adaptation, and Projected Outcome. The HEA can determine what foods are eaten in a particular community, their relative contribution to diets (measured in calories), and be used to model the potential impact of climate shocks on food availability and understand how communities respond to these shocks.

The second section of the chapter explained the reasons why the HEA was adapted. These included its reliance on a small sample of individuals to summarise the livelihood strategies of large geographical areas and its focus on prediction. It then discussed how each method (surveys, interviews and observations) was developed from the HEA and why these changes were made. The limitations of each method were also discussed.

Surveys were chosen to provide an overview of the Rama's food practices and to enable the data to model the potential impact of climate shocks on food availability (as with the HEA). The interviews and observations were suitable for investigating the research questions relating to culture, and individual beliefs and motivations. A number of limitations for the individual methods were highlighted. As explained in detail in this chapter, many of these limitations – including the inability of the surveys to capture individual perceptions – were addressed by the mixed-methods approach of this study. The section also discussed how the impacts of the other limitations – including the inability of the surveys to capture daily fluctuations and the problem of power relationships in the interviews between the researcher(s) and participants – were reduced.

The third section gave a brief overview of the advantages and challenges of mixed methods and explained the way in which the data was mixed through the principle of

pragmatism. The fourth section of the chapter outlined the ethical considerations of the project. This included ensuring no harm was done to respondents (which included a discussion on the process of informed consent), accounting for the difference in power between the researcher(s) and the participants, and ensuring respondents benefitted from the study and how this was achieved. The process of gaining ethical approval from the GTR-K (the governing body of the Rama-Creole territory) was also outlined.

The final two sections of the chapter explained how the research data were collected and analysed. A total of 110 surveys, 41 semi-structured formal interviews and 90 further informal conversations were conducted across the three communities between January and June 2016. The surveys were analysed using descriptive statistics, one-way ANOVAs and regression analyses, and the HEA modelling process. The interviews and observations were analysed using Applied Thematic Analysis.

## 4. The foodways of the Rama

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This chapter will provide a general overview of the foodways of the Rama – the type of food they eat, how much they eat of each type of food, and how they acquire their food. This chapter is based on Stage 1 (Baseline) of the original Household Economy Analysis (HEA) framework.

The first contribution of the chapter is its fine-grained analysis of Rama foodways. This is the first dedicated analysis of this kind with this population and it will reveal important differences between and within the three Rama communities studied with respect to their foodways. As part of this contribution, the chapter will discuss the livelihood strategies used by the Rama, including traditional fishing, farming and hunting, and non-traditional livelihood strategies such as informal and wage labour, running small businesses and remittances. It is important to outline these data in this chapter because the other results chapters will draw upon this information.

The second contribution of the chapter is to highlight some of the advantages and disadvantages of the adaptation of the HEA framework used by this research project. The data used come from the household surveys, the semi-structured interviews, the observations and some secondary sources.

The chapter is separated into four sections. The first section will briefly describe the different communities where the fieldwork was conducted (as outlined in detail in the introduction) and present data on the demographics and wealth scores of the families captured by the household surveys. The second section will outline the types of food the Rama eat and the quantity of the different foods eaten by the Rama. It will highlight the differences in these data between the three communities. The third section of the chapter will present data relating to how the Rama source their food, including a description of the different livelihood strategies they use. It will discuss the reasons why households pursue different livelihood strategies, the differences in access to resources that each of the three communities have, and how this impacts on the livelihood strategies employed by families in the different communities. The two middle sections will also highlight how the adaptation of the HEA framework has facilitated these findings. The fourth and final section will summarise the chapter's findings.

#### **4.1: The three communities**

The first community studied was Rama Cay, an island situated in the Bluefields Lagoon about 10 miles from the town of Bluefields. It is the largest Rama settlement with the population estimated to be  $\geq 42\%$  of the total Rama population<sup>1</sup>. The mainland shore – including the mouth of the Kukra River – is about 1 mile from the island. The port of El Bluff and access to the sea is about 10 miles away across the Lagoon.

The second community is called Tik Tik Kaanu and is situated about six miles upstream from the mouth of the Kukra River. The dwellings are more spaced out than on Rama Cay. The Rama who live in the community farm on the surrounding land, and cattle are able to graze within the community limits. It is possible to catch fish throughout the year in the part of the Kukra River that runs through the community.

The third community is called Sumu Kaat and is located 24 miles west of Rama Cay, further upstream along the Kukra River from Tik Tik Kaanu. The river flows past the centre of Sumu Kaat, but in the dry seasons (which are between February and April and in the month of August<sup>2</sup>), it is not deep enough to be navigable by motor-powered boats. The community is surrounded by undulating farmland, some of which is quite steep. This elevation means that travel to the market settlement of San Pancho – which is about five miles away – takes 2-3 hours depending on the mode of transport.

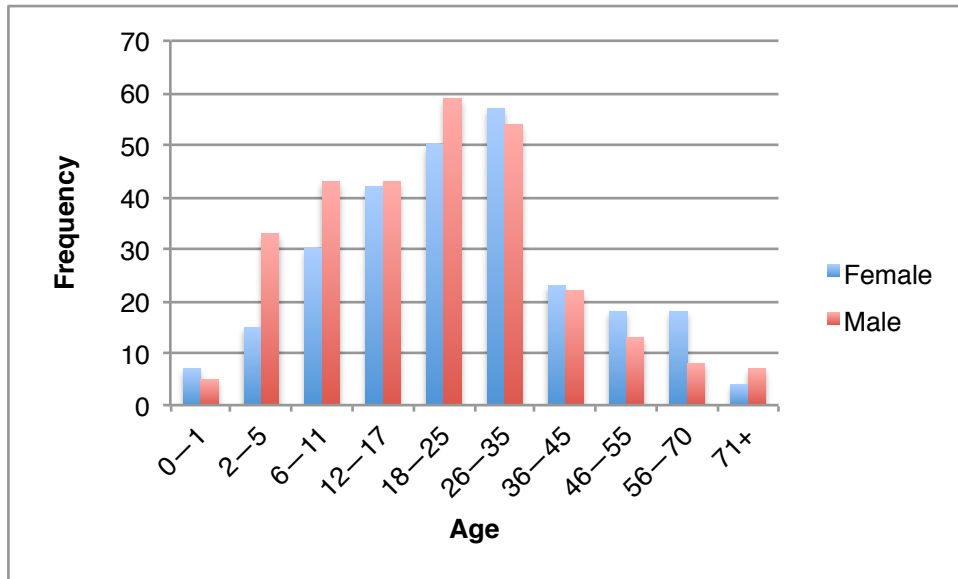
Because of the relatively small sample of households in Tik Tik Kaanu and Sumu Kaat (16 and 11 respectively), it is difficult to make conclusive pronouncements of any demographic differences between the three communities.

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<sup>1</sup> This is an estimate because no accurate census data currently exists. The percentage of the Rama population who live on Rama Cay could be as high as 67%.

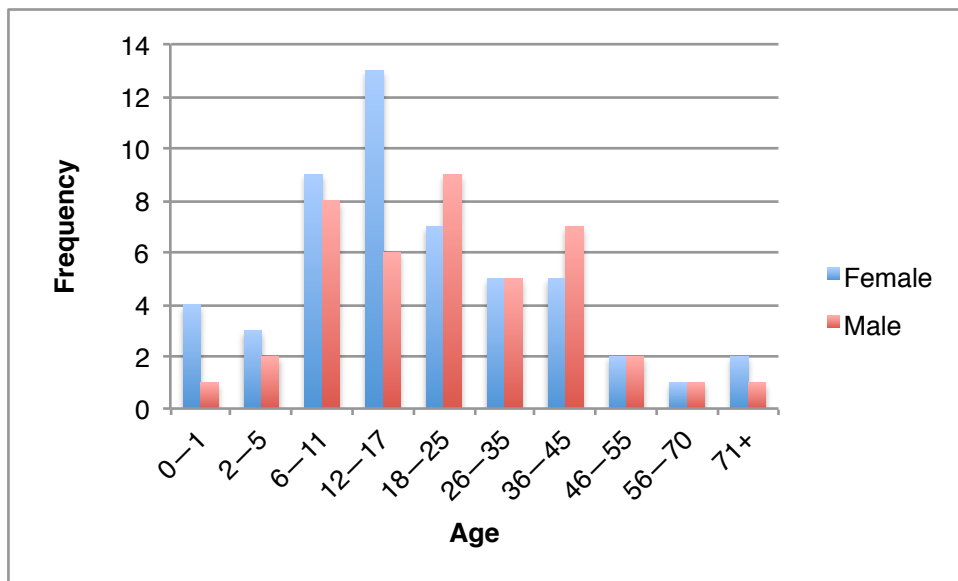
<sup>2</sup> For a full climate, agricultural and economic calendar of the Caribbean Coast of Nicaragua, see Figures 4.13 and 4.14 (below).

**Figure 4.1: Demographic make-up of Rama Cay households surveyed**



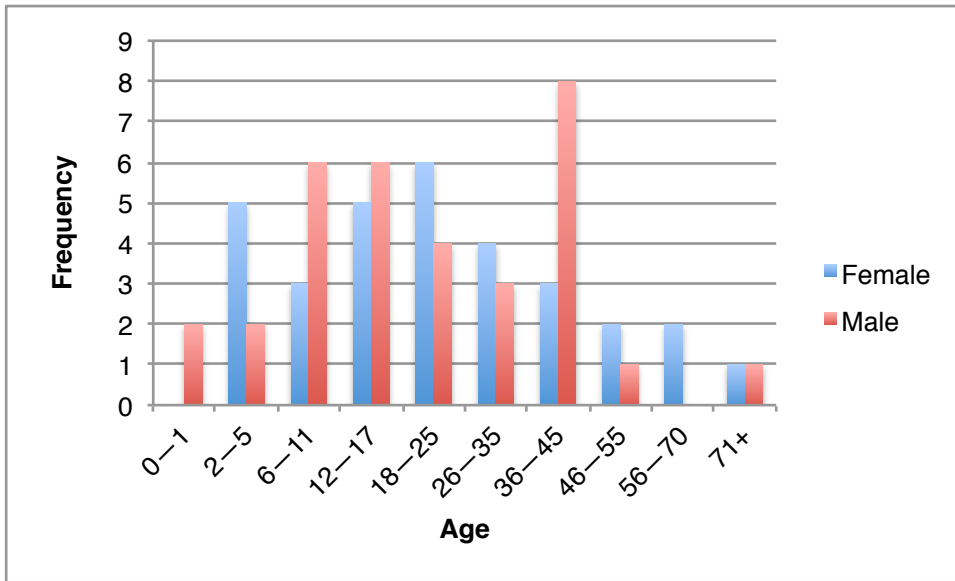
Source: Author

**Figure 4.2: Demographic make-up of Tik Tik Kaanu households surveyed**



Source: Author

**Figure 4.3: Demographic make-up of Sumu Kaat households surveyed**



Source: Author

The interviews suggest that elderly Rama people tend to move to Rama Cay to be closer to family when they are less able to work. Respondent #5 had spent most of her life living on the mainland, but had moved to Rama Cay after the death of her husband to be closer to her daughter so she could be supported. Respondent #S94 lives in Tik Tik Kaanu and, at 88 years old, was the oldest Rama person surveyed who did not live on Rama Cay. She lives almost entirely on the gifts she receives from other people in the community.

Previous research suggested the Rama all followed seasonal patterns of inter-community migration (Riverstone 2004). The data collected for this thesis, however, suggest this does not occur as much as it used to. During January 2016, some members of Rama Cay families did choose to live almost permanently away from their homes in order to farm, but most spent almost all of their time on the island during the data collection period as a whole. This will be discussed in more depth in the final section of this chapter.

The average number of household members is slightly higher in Rama Cay at 6.7 than in the other two communities (5.4 in Tik Tik Kaanu and 5.9 in Suma Kaat respectively). This may be because older family members tend to go and live on Rama Cay when they retire and this would slightly swell the household size. This difference, however, is not statistically significant (based on a one-way, between subjects ANOVA).



On average, the Rama in all three communities stated they spent about 28C\$ (US\$1)<sup>3</sup> each day on food. Figure 4.4 (below) shows the monthly income of Rama families as stated in the household surveys. The Rama Cay households are family numbers 1 to 83, the Tik Tik Kaanu households are family numbers 84 to 99 and the Sumu Kaat households are family numbers 100 to 110. Most Rama Cay households have at least some income and there are a few families who earn a great deal more than others. Based on my knowledge of the anomalous households, there is no reason to suggest these data are erroneous as some households on Rama Cay clearly had more resources than all the other Rama surveyed. None of the Sumu Kaat households revealed any income when the household surveys were administered, but the interview data suggested some of them do have incomes from selling their produce or from part-time work. The missing data in this measure means that the planned statistical analysis of the differences between the communities is not sufficiently robust.

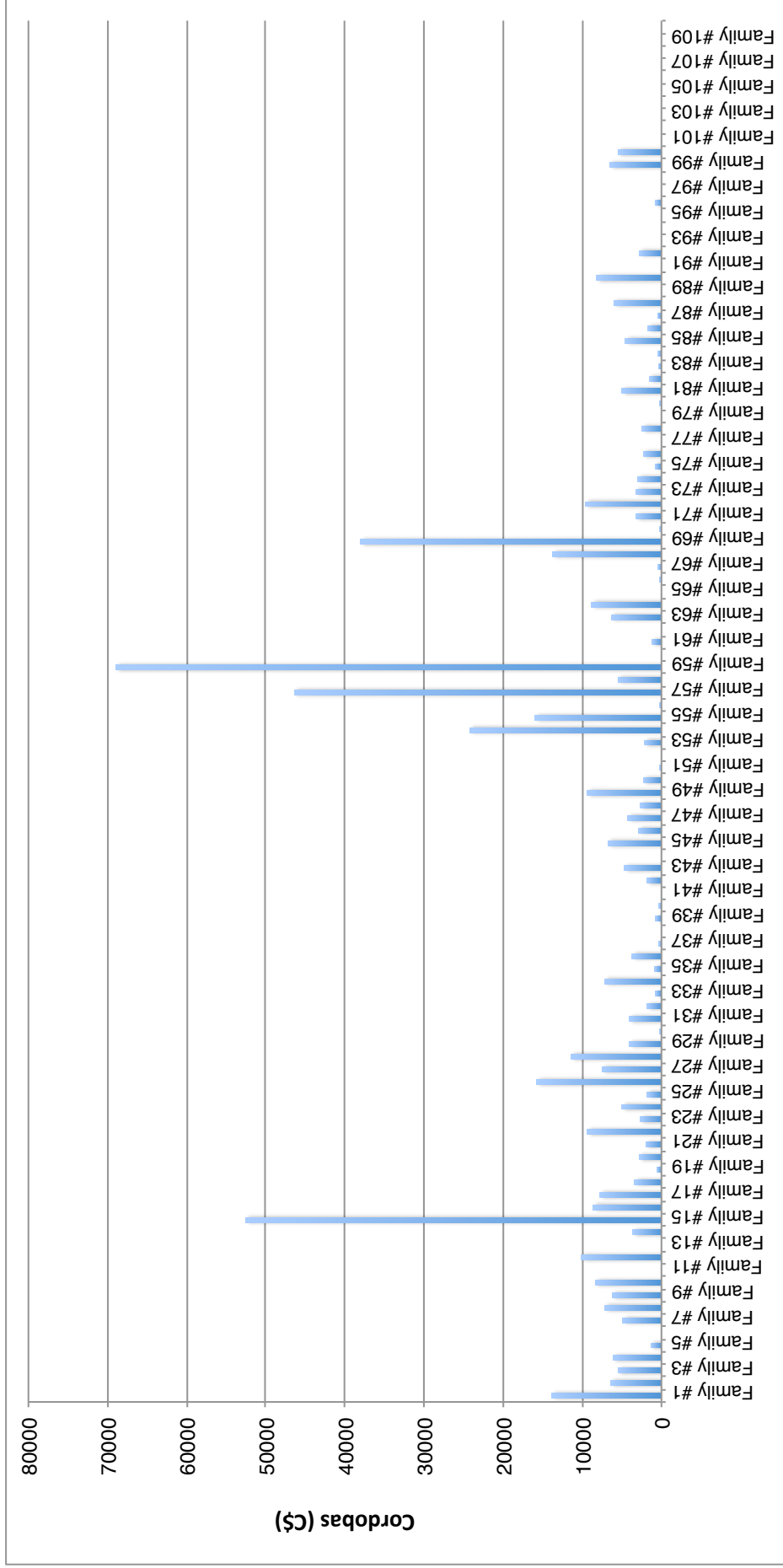
There are no missing data related to the assessment of household assets (wealth score), however, and this is shown in Figure 4.5 (below). Because the data were not normally distributed, a Kruskal-Wallis test was conducted to determine whether the average wealth score is different between the three communities. This showed there was no statistically significant difference (at the  $p < 0.05$  level) between the different communities,  $\chi^2(2) = 5$ ,  $p = 0.082$ , with a mean percentage of 56 for Rama Cay, 65 for Tik Tik Kaanu and 37 for Sumu Kaat.

This section has provided a brief overview of some of the differences between the three communities and these differences will be returned to throughout this thesis.

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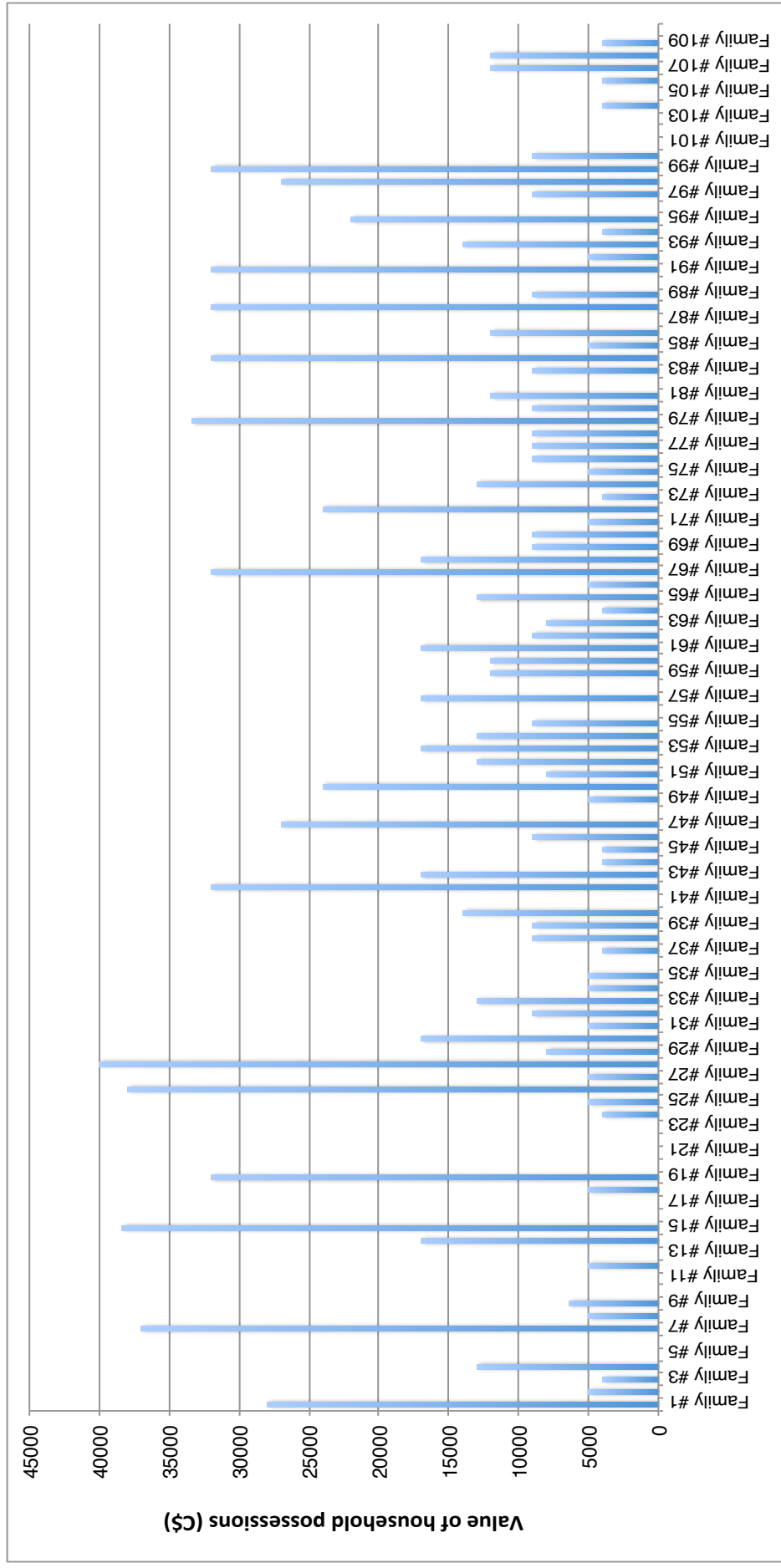
<sup>3</sup> Conversions from Nicaraguan Cordobas (C\$) to US Dollars (US\$) are rounded to the nearest whole Dollar, unless when the value is less than \$5. Conversions are based on the average exchange rate at the time the fieldwork was conducted (28.1C\$ = US\$1)

**Figure 4.4: Monthly income in Cordobas (C\$) for all Rama households surveyed**



Source: Author

**Figure 4.5: Assessment of household assets (wealth score) for all Rama households**



Source: Author

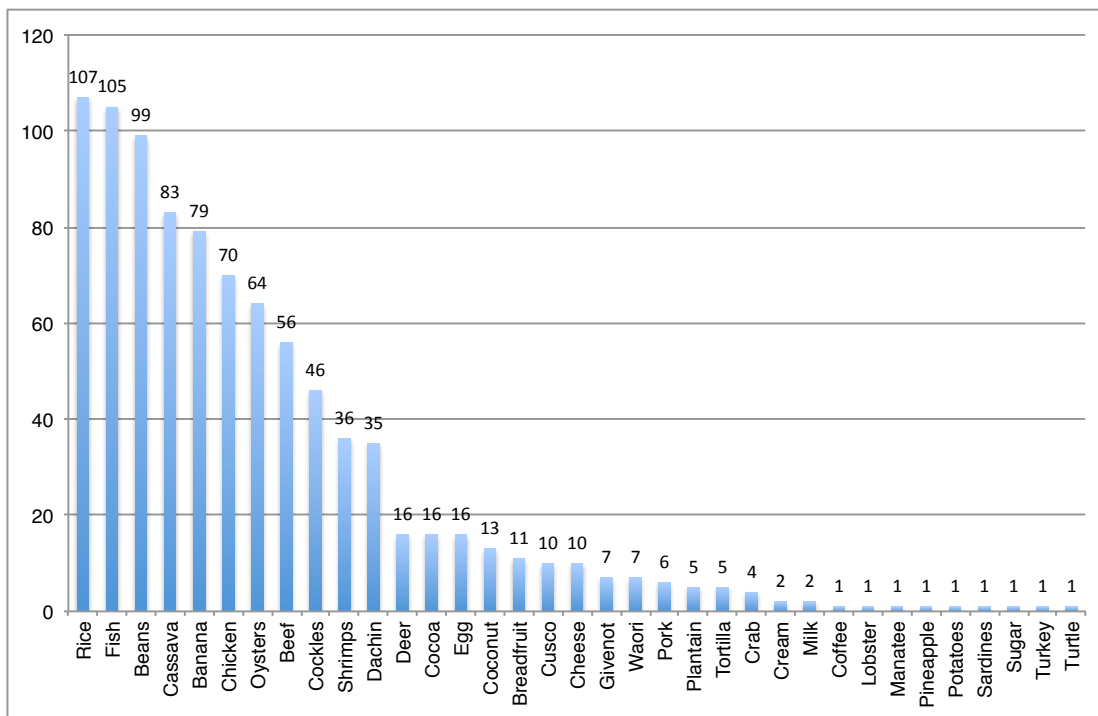
## 4.2: What type of food do the Rama eat?

This section will describe the types of food eaten by the Rama. It will highlight a difference of opinion about what can be considered traditional Rama food and argue that revealing these differences is one of the advantages of the way in which the HEA framework has been adapted for this study.

The household surveys asked respondents about the food items they ate every day and then about the other food they ate less frequently and the frequency that they ate it. According to these data, the food that the Rama in all three communities eat most frequently are rice, fish and beans (see Figure 4.6, below).

Rice and beans – either cooked separately, or together in one pot as a dish called Gallo Pinto – are a Nicaraguan staple, eaten by most households nationally. Rama people have not always eaten rice and beans, and evidence from the interviews suggests that doing so is a relatively new phenomenon. Some of the older respondents said that breadkind used to be the chief accompaniment to fish.

**Figure 4.6: Number of families mentioning individual food items**



Source: Author

Fish is very important for the Rama (Riverstone 2004), and they eat 56 different species<sup>4</sup>. The Rama cook the fish by frying or roasting it and serving it with Gallo Pinto or root vegetables<sup>5</sup> – known locally as breadkind – or it is eaten in a soup or in a dish called Rondon. Rondon originated in Jamaica and Tobago, and consists of fish and breadkind stewed in coconut milk.

It is not surprising given the previous reliance on breadkind that the next most commonly mentioned food items were cassava and banana. Both of these are usually boiled and served alongside Gallo Pinto, or included in Rondon.

Chicken was the most commonly mentioned meat and beef was frequently cited as an important food. The majority of Rama say beef is the meat of choice for important occasions including Christmas and Easter. A number of Rama families said they ate deer, gibbon (a rodent more commonly known as the paca), and waori (the Rama name for peccaries). Six families surveyed mentioned pork, but many of the Rama who were interviewed claimed most Rama did not eat it. The reasons given for this included not liking the taste, being allergic to it, and it not being a traditional Rama food. Turkey and turtle meat were mentioned by one family each.

Oysters are regularly eaten on Rama Cay and the used shells are deposited all around the island and used to construct some pathways (Personal Observation, 2015). Oysters tend to be eaten in a soup and accompanied by Gallo Pinto. Other sea, river and lagoon food<sup>6</sup> mentioned by the families include cockles, crab, lobster and manatee. Traditionally, manatee is an important food for the Rama, but their numbers have declined considerably in recent years. The Rama have traditions surrounding the capture and sharing of manatee, but these are now generally not adhered to. They will be discussed in more detail in chapter eight.

Breadfruit does not appear to be a particularly important food for the Rama based on the surveys, but the interviews suggest it is one of the most important and frequently eaten foods. This is also true of coconut, which is used for Rondon and to add flavour to dishes including Gallo Pinto and soups. These items may not have figured much in the

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<sup>4</sup> See Appendix 3

<sup>5</sup> Including yam, cassava, banana, plantain, dachin (similar to plantain) and breadfruit

<sup>6</sup> Henceforth collectively described as 'seafood' and encapsulating all aquatically-sourced food regardless of whether it comes from the sea, the Bluefields lagoon and/or the rivers within the Rama territory

surveys because the Rama do not often eat them on their own and so didn't include them when responding to the way the questions were asked.

Only one family surveyed said they ate tortillas, but again the interviews and observations suggested that many families eat it relatively frequently. Fruit was also only mentioned once, with one family saying they ate pineapple. This is not surprising based on the diets of the Rama and other Nicaraguan indigenous groups (Personal Observations 2015, 2016). Fruits are considered to be an expensive luxury by the Rama. They are also seasonal and the surveys were conducted when many fruits typically eaten by the Rama were not available.

When asked, many respondents on Rama Cay named oysters as the most "traditional" or "real" Rama food. However, there were multiple viewpoints across the three communities. Six respondents named Rondon as a traditional Rama food and some named Gallo Pinto. There is a large Jamaican diaspora on the Caribbean Coast of Nicaragua and the local Creole population also consider Rondon to be a local delicacy. As noted in chapter one, the Rama have lived on the Caribbean Coast longer than the Creole population, so it is unlikely that it has always been a Rama food. Respondent #23 was quite effusive in rejecting Rondon and Gallo Pinto as Rama foods: "Rondon is next thing and next people tradition like the Creole. Gallo Pinto? Nah, neither [because] that's Mestizo food".

Regardless of this, Rondon was the dish that most Rama people said was their favourite to eat. It is possible that as very few mentioned any of the traditional food items identified in Grinevald and colleagues (2012)<sup>7</sup> some Rama understood this interview question to be asking about common or favourite foods. Oyster soup was the only traditional Rama dish identified in Grinevald and colleagues (2012) that was mentioned by most Rama without further prompting. When prompted about some of the other foods mentioned in the literature, Rama respondents most commonly talked about Wabul. Wabul is a drink made of mashed banana, water and coconut milk.

Respondent #30 spoke at length about some of the other foods considered by some to be traditional Rama foods:

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<sup>7</sup> A resource published by a local cultural initiative, which documents traditional Rama food and ways of preparing and cooking traditional food

“What we put in [soup] like traditional, old days people [...] we put only chopped banana in the soup [with] flour. Only natural, nothing like chemic [food additives] and we use the basil [to] make the taste. People here not use oil. Them feel like them can’t. The most, proper Rama people use them coconut. [When preparing fish] them roast it and make hash. That is our traditional for make the fish. Not only fish [but] crab stew. [Just] mix it and then make hash, fish hash.”

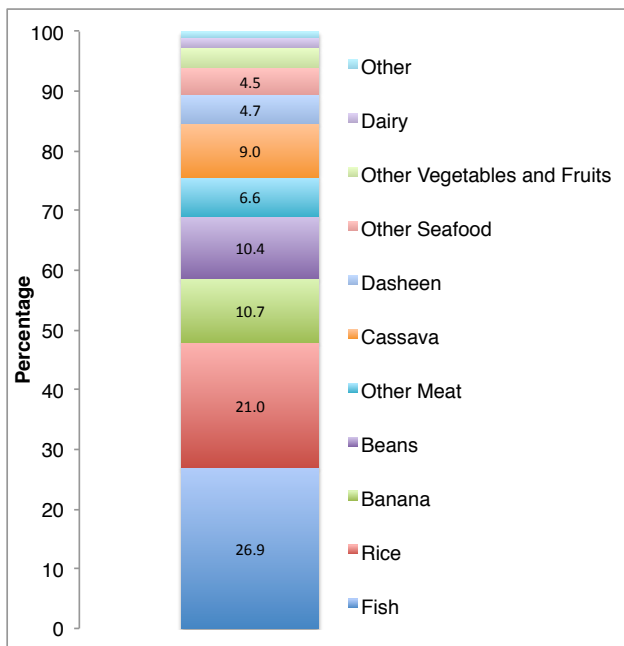
Whereas the Rama obviously consider the food outlined in publications like Grinevald et al. (2012) to be important parts of their identity, it is likely they are now eating them less frequently, meaning it is harder for them to pinpoint a concept of traditional Rama food. The reasons for this shift away from traditional foods will be discussed in Section 4.4 of this chapter and at various points throughout the thesis.

It is possible that the original HEA framework, with its reliance on a smaller sample, may not have picked up on these differences of opinion about what food is traditionally Rama. This is particularly important because the HEA quantifies food based only on calories. As highlighted by the entitlements approach to food security, not all calories are equal—food has to be culturally acceptable to the population that consumes it (FAO, IFAD, UNICEF, WFP & WHO, 2017). When food security is threatened some Rama households may choose to privilege certain foods over others because of their cultural importance. This could contribute towards an inequality in both vulnerability and response to threats that would not be highlighted by the original HEA framework.

### **4.3: How much do the Rama eat?**

The previous section of this chapter outlined the frequency of families mentioning that they ate particular food items. This does not show the impact of the different energy values of different foods. For this reason, the weight and frequency of each food item was converted into calories to enable a more direct comparison (see Figure 4.7 below). The methodology chapter (chapter three) explains in more detail how this was achieved.

**Figure 4.7: Calories consumed per food item as a percentage of total calories  
(All Rama)**

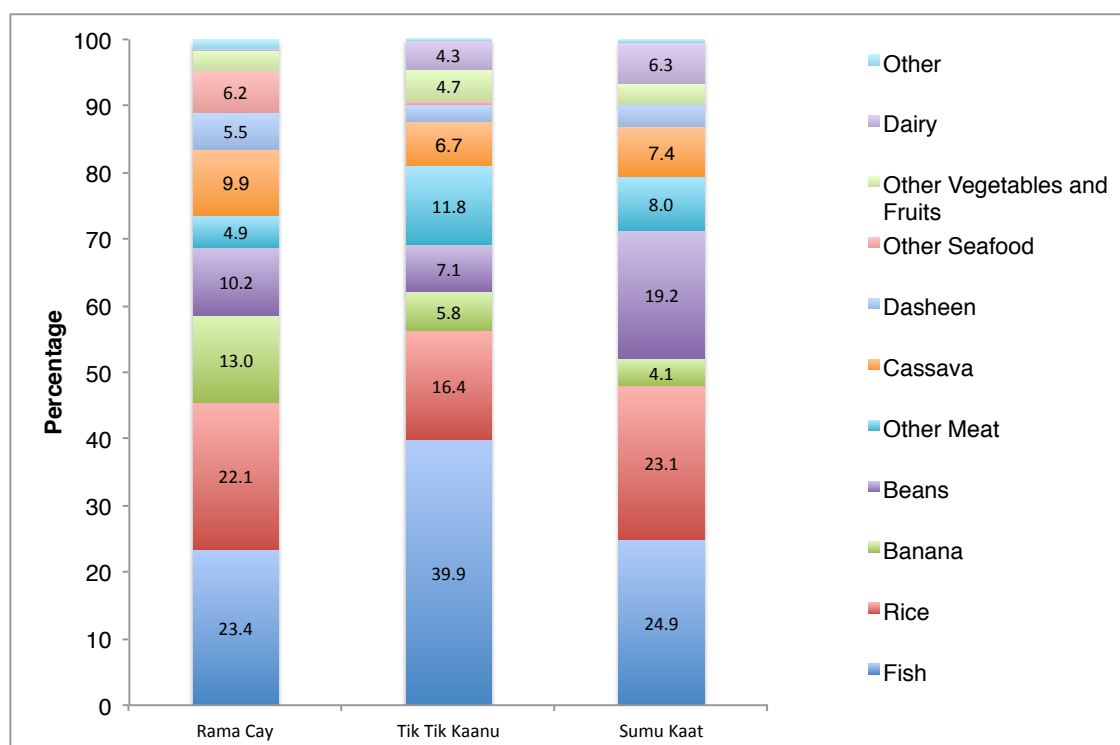


Source: Author

Figure 4.7 shows that fish provides more than a quarter of all the calories consumed by the Rama in all three communities. Staples including rice, beans, bananas and cassava are the next most important contributors with meat, other seafood and other vegetables and fruits contributing less than 15 percent of all calorie intake. As mentioned in the methodology chapter (chapter three), there are many variables in the collection of the data that could have influenced this result, including how the food was cooked. Figure 4.8 (below) breaks down these calorie percentages into the three different communities.



**Figure 4.8: Calories consumed per food item as a percentage of total calories  
(By community)**



Source: Author

The qualitative data suggest that Sumu Kaat households may eat less fish than households of the other two communities. This is because no fish can be caught from the Kukra River that runs past the community during the dry seasons (between February and April and during the month of August). This is not shown in the household survey data however. These data instead suggest that fish provide roughly the same proportion of all calories for both Rama Cay and Sumu Kaat households (with fish contributing 23.4 and 24.9 per cent of their total calorie intake respectively). In contrast, Tik Tik Kaanu households eat a much greater proportion of fish than the other two communities, at nearly 40 per cent of their calorie intake. There does not seem to be a clear reason for this, especially as the qualitative data suggested that those in Tik Tik Kaanu rely more on their farms and hunting and less on fish than those who live on Rama Cay. It may be that because there are a greater variety of alternatives for residents of Rama Cay that fish contributes less to their diets proportionally.

Other seafood – including mussels, cockles and prawns – appears to be barely eaten in Tik Tik Kaanu and Sumu Kaat. While this group contributes 6.2 per cent of Rama Cay resident’s total calorie intake, it contributes only 0.6 per cent of Tik Tik Kaanu

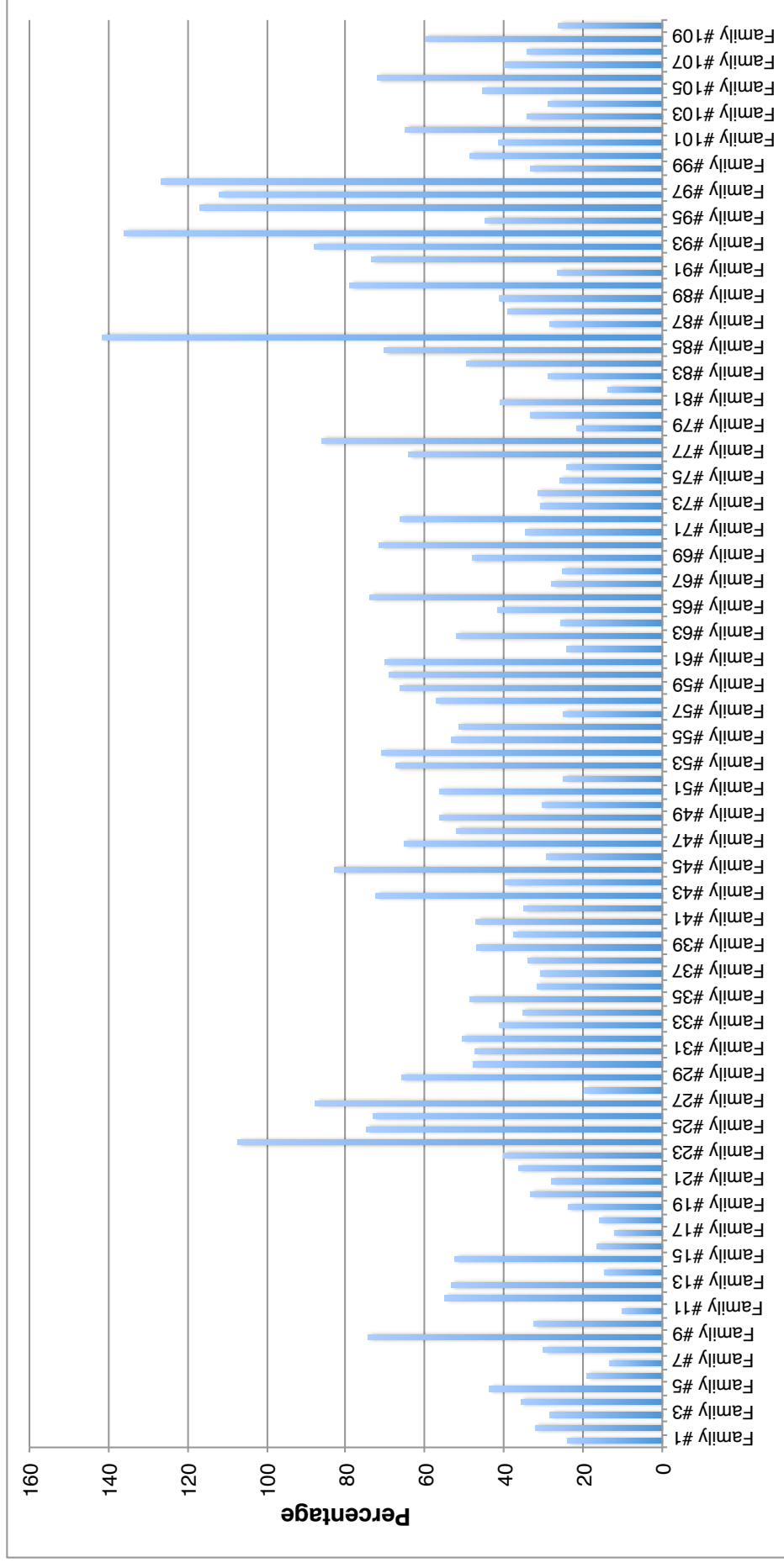
resident's total calorie intake (all from prawns) and nothing at all to the total calorie intake of Sumu Kaat households. This might be expected as the oyster and cockle banks are all located in Bluefields Lagoon. They are therefore between 30 minutes and one-hour's travel time in a motorboat from Tik Tik Kaanu, and between three hours and three-and-a-half hours travel time in a motorboat from Sumu Kaat. As mentioned previously, when the river passes near to Sumu Kaat, it is not deep enough for motorboats to be used to access the community during the dry seasons (between February and April, and the month of August). The residents have to travel along the river using dories – small, hand-carved wooden boats propelled either by carved wooden oars or small sails – instead. During these months, therefore, the cockle and oyster banks will be even more difficult for Sumu Kaat households to access.

It is not surprising that Sumu Kaat households eat more beans than the other communities as the interviews suggest that, as a community, they grow the most crops. The qualitative data suggests that Rama Cay households may eat less dairy food than those who live in the other two communities and this is supported by the household survey data. Dairy products make a very small contribution to the food intake of Rama Cay households (0.3 per cent), which stands in contrast to the consumption of Tik Tik Kaanu and Sumu Kaat households for whom dairy contributions are 4.3 and 6.3 per cent of their total calorie intake respectively. This is likely because it is not permitted to allow livestock to graze on Rama Cay because of limited space on the island.

There are differences in the amounts of meat eaten between the three communities, but it is difficult to tell what this might indicate in terms of the findings from the interviews. The qualitative data suggest Rama Cay households generally have greater spending power and are therefore more likely to be able to buy meat products. In contrast, households in the other two communities hunt more frequently and have the space to raise cattle and other animals, though the interview data suggests these are now more frequently used as cash stores than slaughtered for food.

For each household, a daily calorie requirement was calculated based on the number of family members and their age and gender. The methodology chapter (chapter three) explains how this was done in more detail. Figure 4.9 (below) shows the daily calorie intake of each household (based on the household surveys) as a percentage of this calculated calorie requirement.

Figure 4.9: Calories consumed per day by family as a percentage of their calorie requirements



Source: Author

As can be seen, most families (n=104; 94.5 percent) are not consuming the amount of calories they should be consuming, based on the information they gave during the household surveys.

The accuracy of these findings were checked in the feedback meeting conducted at the end of the fieldwork collection period. As Rama individuals generally do not use calories to measure their food, they were instead asked how much they normally spent on food per day as these data are likely to be closely linked. The Rama present stated they spent about 150-200C\$ (c. US\$5-7) day on food, much more than the 28C\$ (US\$1) suggested by the survey data. This might suggest that the daily amount of food being consumed by the Rama as recorded by the household surveys is lower than what they were actually consuming.

The families who attended the meeting were wealthier than the average Rama households, which will account for some of the discrepancy between the average daily spend according to the surveys and the daily spend judged to be correct by the meeting attendants. It is unlikely, however, to account for the entire difference. It is important to discuss the reasons for this discrepancy because these data provide the underpinnings of the results presented in the later chapters of this thesis.

The first potential reason for this discrepancy between the stated calories consumed by each family and their required intake based on their family demographics could be the limitations of the household surveys. As outlined in the methodology chapter, the household surveys were unable to show daily fluctuations such as food prices, personal preferences, cooking methods and the impacts of individuals' physiology. This is also a significant limitation for the original HEA framework, but the smaller sample size used affords researchers more time to try and establish and adjust the source of these sorts of fluctuations than was possible with the adaptation used for this thesis.

A second potential reason for this discrepancy could be because school-aged<sup>8</sup> Rama children receive their lunches free through a government scheme. When asked, families stated they did not consider this food to be included in the daily intake they stated for the surveys. When school-aged children's calorie requirements are adjusted to half of their daily requirement (to represent a requirement of only one main meal to be

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<sup>8</sup> School-aged children recorded as 5-17 years old

produced from their family's food), the number of families that are eating at least 100 percent of their required calories increases by 5 to 11. This is not a consistent measure of the calorie requirements of all families year round, however, because these children do not receive food outside of term time. Because of these problems with the data and because this adjustment did not make a huge difference to the percentage of families who were meeting their daily calories requirement, it was not used in the remainder of the data analysis.

A third potential – or jointly contributing – reason for this discrepancy could be the consumption of packaged snack foods such as crisps, chocolates, nuts and biscuits. There are six shops on Rama Cay, two in Tik Tik Kaanu and one in Sumu Kaat and all of them sell these snack foods. Whenever I was in or within sight of these shops, there was a steady stream of Rama buying – and often immediately consuming – these types of food. Those who bought these items tended to be younger, typically under the age of 18, but I observed all ages eating them. Theoretically, Rama households should have mentioned these food items when responding to the household surveys, but they did not. This may be because the respondent was unaware of the amount of snack food other family members were eating, or because they chose to ignore it when responding to the surveys. This may account for the reason why there is a discrepancy between the stated calories consumed by each family (according to the household surveys) and their required intake based on their family demographics.

The final potential – or jointly contributing – reason for this discrepancy could be that responses may have been affected by social desirability bias. As was noted in the methodology section of this thesis (chapter three), respondents may have changed what they said according to what they believed the purpose of the research project to be. It is worth reiterating what was said by a scholar quoted in Barrett and Cason (2010: 110): “[If respondents] thought we were somehow there to ‘judge’ their eating habits, they would tend to exaggerate the data to make it seem as if they were consuming all the things that are supposed to be good for you [...] On the other hand, if they thought we were there for a handout, they would under-report”. While the informed consent process allowed me to explain that the research project was completely independent so as to try and avoid this bias, it does not mean the respondents believed this. Recent data from the UK suggests that individuals may consume up to 50 percent more calories than they claim they do when responding to questionnaires (Harper and Hallsworth, 2016). This

study was conducted in a very different context and the reasons for the discrepancy noted by Harper and Hallsworth (2016) are likely to be quite different from the reasons for the discrepancy of the Rama's responses presented in this thesis. It does lend weight to the argument, however, that the discrepancy between the stated calories consumed by each family and their required intake could be due to under-reporting that is inherent with survey-based data.

In summary, the data collected by the surveys suggest there are subtle differences between the three communities in terms of the amount of particular food items that are eaten. Those families living on Sumu Kaat appear to eat more beans than the other two communities, which may be because they live closer to the farms. Rama Cay residents eat less dairy foods, but more oysters than the other two communities. This is likely to be because the oyster banks are considerably closer to Rama Cay than the other two communities, and because cattle are not allowed to be kept on the island. The Tik Tik Kaanu residents appear to eat much more fish than the other two communities.

The surveys also suggest the Rama are not eating enough food as per their expected calorie requirements. This could be because the surveys were unable to account for factors such as: daily fluctuations in personal preferences and cooking methods; individual physiology; the difficulties of accounting for when children eat food at school; lack of consideration of snack foods; and/or social desirability bias or other causes of under-reporting.

The advantages and disadvantages afforded by this study's adaptation of the HEA framework have contributed towards the findings outlined in this section. Even if the original HEA framework had been able to highlight the differences that were found by this study, it would have been unlikely to be able to explain them. This matters because understanding the differences within communities is important for making important policy decisions such as those aimed at development or climate change adaptation. However, because sampling a much larger number of households took longer, there was limited time to check and clarify for discrepancies, which may have led to a poorer quality of data being collected for each family than would have been done with the original HEA framework. This was seen with the discrepancy between the number of calories households said they were eating and the number of calories they required. Holzman and colleagues (2008) state that if this occurs when conducting the HEA

framework, the data needs to be checked. This was attempted in the feedback meeting on Rama Cay, but this was insufficient because the semi-structured interviews required considerable resources and the full extent of the discrepancy was only noticed after the data collection period was concluded.

#### **4.4: How do the Rama source their food?**

This section of the chapter will describe how the Rama source their food. These data are included as they underpin some of the findings presented in the following chapters and highlight important differences between the three communities. The chapter will critically engage with the literature on livelihood strategies.

These data challenge the characterisation of the entire Caribbean Coast as being reliant on “traditional fishing” as outlined by FEWS-NET (Browne, 2009). The more lengthy description of this livelihood strategy<sup>9</sup> captures some of the Rama’s livelihood strategies, but it does not cover the extensive variety—including subsistence fishing and farming through to full-time, waged employment. For the purposes of this section of the chapter, the livelihood strategies are classified as either traditional or non-traditional, but many Rama pursue two or more livelihood strategies simultaneously, often depending on the abundance of each food resource (which varies by year and season), the availability of wage labour and the skill or health of their family members. Those Rama who have multiple livelihood strategies gain from this diversity, principally from their expanded networks and greater access to resources. This will be discussed further in this chapter and again in chapter eight.

This section is separated into three sub-sections. The first will present the data from the household surveys to give a rough overview of how the Rama source their food. It will show there is a significant difference between Rama Cay and the other two communities. The reasons for this difference will then be discussed in the remainder of the sub-section. The second sub-section will discuss the traditional livelihood strategies undertaken by the Rama—principally fishing, farming and hunting. It will discuss the different levels of access that the Rama living in the three communities have to natural resources and markets. This will contribute to the explanation for the differences

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<sup>9</sup> Reproduced in Appendix 6

between the communities highlighted in the first sub-section. The final sub-section will discuss the non-traditional livelihood strategies that many Rama now pursue, often simultaneously with traditional livelihood strategies. These include short-term and formal contracted work, small-scale trade and remittances. As with the other sub-sections, the differences between the three communities will be highlighted.

#### *4.4.1: Household survey data*

Traditionally, the Rama relied on subsistence fishing, farming and hunting. In the present day, however, a large amount of the food the Rama produce or acquire wild is sold on for cash. The most notable exception to this is oysters and cockles, although some Rama do still buy and sell these between themselves. For most families, a large part of the food they eat is bought – either from local markets or tradesmen, or from other Rama families. This can be seen in the household survey data. All families were asked how they acquired each individual item of food they mentioned in the household surveys – either bought, produced, wild or gifted<sup>10</sup>. Figure 4.10 (below) shows the source of each household's calories as a percentage of their total calorie intake.

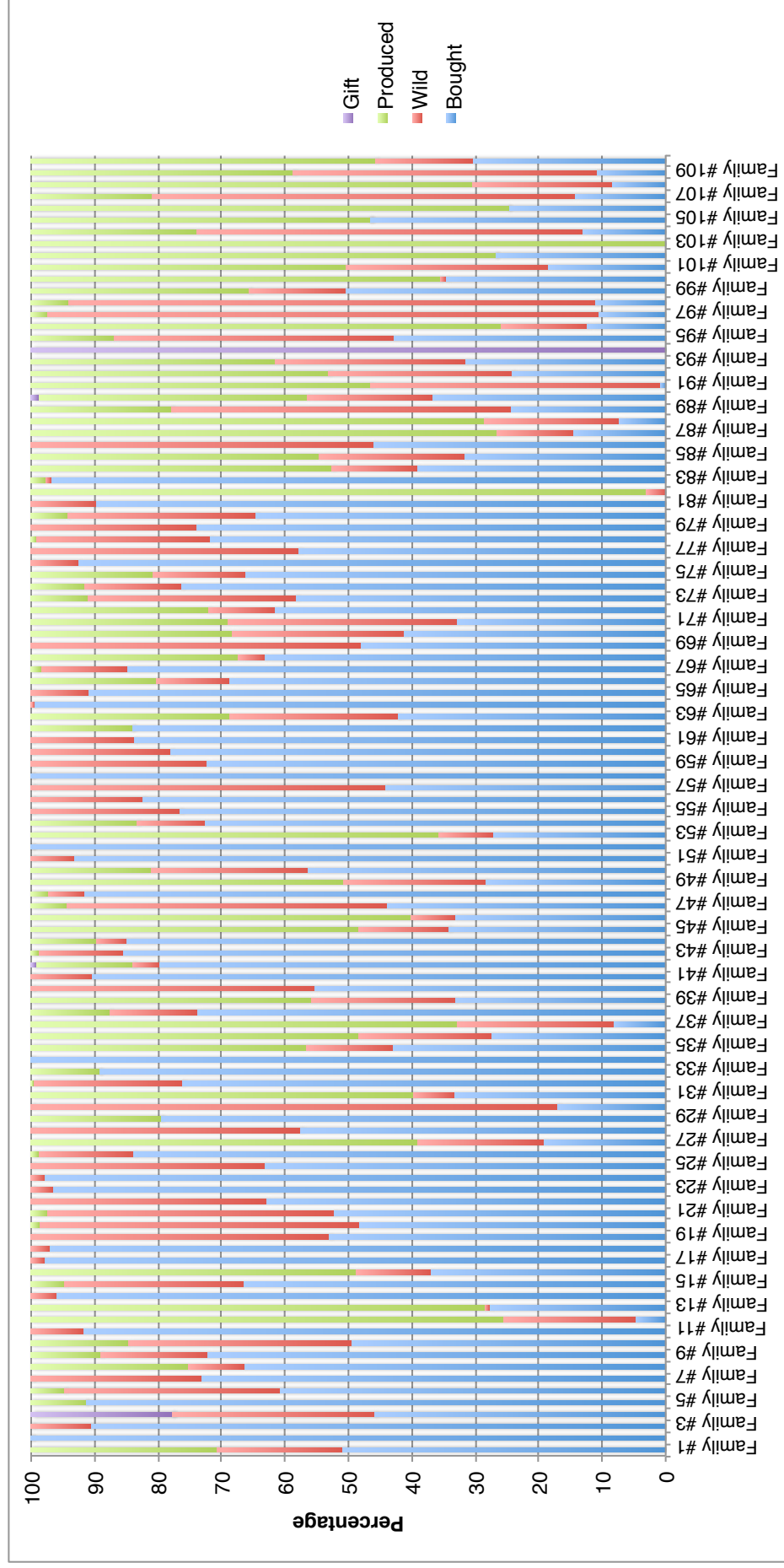
As can be seen from the data, it appears as though families who live on Rama Cay (Family #s 1-83) tend to source a higher percentage of their food by buying it than the other two communities (Family #s 84-110). Because the data were not normally distributed, a Kruskal-Wallis test was conducted to determine whether the average amount of bought calories as a percentage of all consumed calories is different between the three communities. This showed there was a statistically significant difference (at the  $p < 0.05$  level) between the different communities,  $\chi^2(2) = 41$ ,  $p = > 0.001$ , with a mean percentage of 67 for Rama Cay, 24 for Tik Tik Kaanu and 18 for Sumu Kaat.

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<sup>10</sup> As outlined in the methodology chapter (chapter three): Bought food is the food the Rama eat that they have purchased with cash acquired from employment, the sale of items or other sources; Produced food is that which has been grown on the Rama's plantations; Wild food has been sourced through hunting, fishing or foraging; and Gift food is the food that the Rama receive without a cash charge from other Rama households, NGOs or other sources (though some other form of reciprocation may be expected).



Figure 4.10: Source of calories as a percentage of all calories consumed by all families



Source: Author

Post-hoc comparisons were conducted using Mann-Whitney U tests with significance at the  $p < 0.015$  level to reduce the chance of Type 1 error. These showed the average contribution of bought calories as a percentage of all calories consumed was greater for Rama Cay than for Tik Tik Kaanu ( $U = 149, p = >0.001$ ), and greater for Rama Cay than for Sumu Kaat ( $U = 57, p = >0.001$ ), but that there was no significant difference between Tik Tik Kaanu and Sumu Kaat ( $U = 70, p = 0.443$ ). This suggests that families who live on Rama Cay buy a significantly higher percentage of their food than families who live in the other two communities. By extension, it could be argued that Tik Tik Kaanu and Sumu Kaat families follow more traditional (subsistence) livelihood strategies as evidenced by their higher consumption of produced and wild food. There is no significant difference ( $p=0.935$ ) between the average contribution of calories bought as a percentage of all calories by families that live in Tik Tik Kaanu and families that live in Sumu Kaat. As mentioned, the reasons for this difference between the three communities are discussed throughout this chapter.

This section has shown that most of the Rama surveyed no longer adhere to traditional (subsistence) livelihood strategies and instead buy a lot of their food. Based on the percentage of each family's calories that come from bought sources, this is truer of families who live on Rama Cay than families who live in the other two communities.

#### *4.4.2: Traditional livelihood strategies*

This section will outline the Rama's traditional livelihood strategies—defined as those that are reliant on the traditional activities of fishing, hunting and farming. It will highlight the differences between the three communities. It is important to reiterate that each of these individual livelihood strategies (both traditional and non-traditional) is not used exclusively by each household, but as part of a suite of strategies (Ellis, 2000).

##### *4.4.2.1: Rama fishing practices*

The Rama fish in the sea, the Bluefields lagoon, and in the rivers that run through the Rama territory. The Rama primarily catch fish using a hook and line while stood on a

river bank, or with a small hand net cast from their dories. This latter strategy is also used to catch prawns<sup>11</sup> (see Figure 4.11 below).

**Figure 4.11: Two Rama fishermen catch prawns at the mouth of the Kukra River during late morning, using a wooden, paddle-powered dory and a hand net**



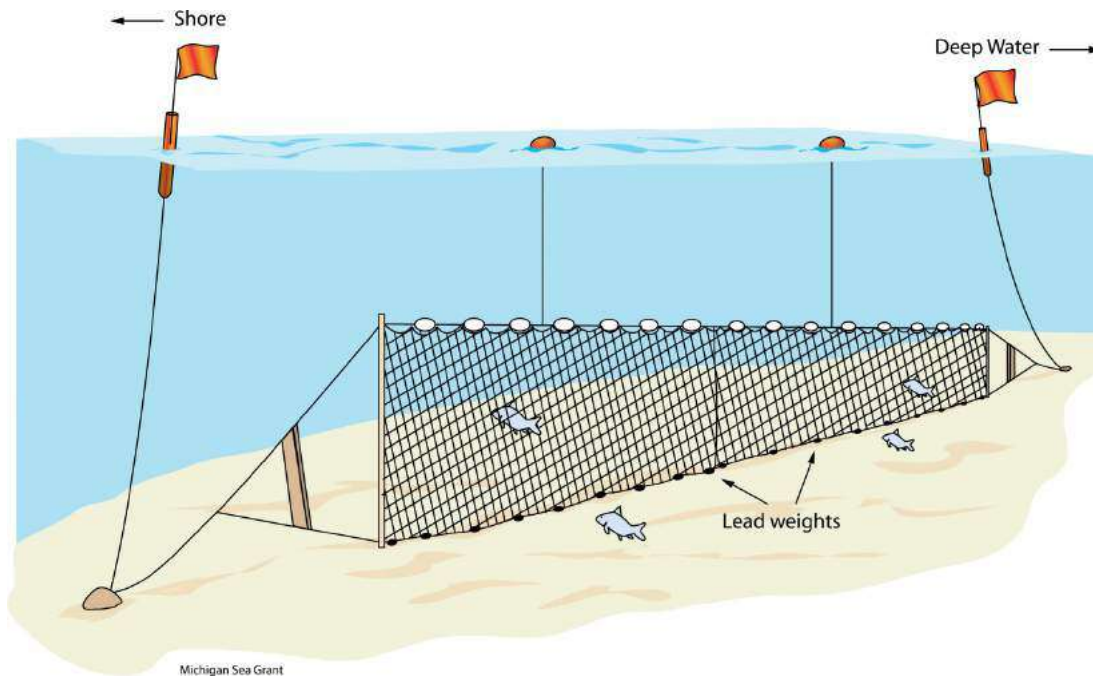
Source: Author

In recent years, there has been an increase in the use of pangas and gill nets to fish. Pangas are larger boats of fibreglass construction usually powered by a motor. Gill nets are large nets that remain stationary in the water, unlike the traditional Rama hand-nets that are continually cast. The gill nets allow the fish to get their heads through the mesh, but the fish's gill covers then prevent them from being able to reverse out of it again (see Figure 4.12 below). The interviews suggest that at least six families on Rama Cay use gill nets rather than hand nets. Some families may use these in conjunction with a motor-powered dory rather than a panga.

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<sup>11</sup> References to fishing in the remainder of this thesis also refer to the catching of prawns

**Figure 4.12: A diagram to show how gill nets are set to catch fish**



Source: Safina Center (2017)

This finding – that some Rama catch fish using non-traditional methods and some don't – is one of the advantages of the more fine-grained analysis afforded by adapting the HEA framework. This difference is an important reason for some of the inequality that exists within Rama society and will be discussed in more detail in chapter seven.

Although turtles can be caught throughout the year using a gill net, the traditional method used by the Rama is to catch them using a harpoon during May and June. The harpoon has a small, sharp arrow that breaks through the turtle's shell and can then be used to pull it back into the boat.

#### *4.4.2.2: Rama hunting practices*

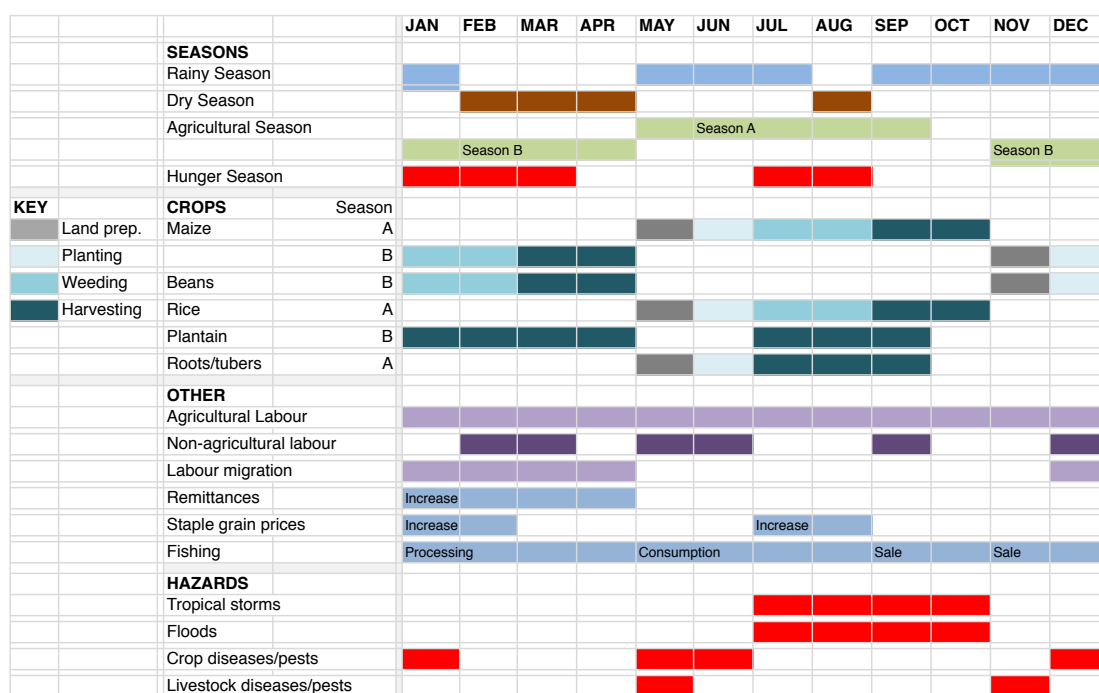
The Rama hunt on the mainland within the Rama-Creole territory. Some Rama hunt for animals like deer, waori, gibnut and jaguars. The Rama often use hunting dogs and Respondent #29 explained that his dog chases animals out to where they can be killed more easily with guns. Respondent #26 spoke about using a dog as bait for jaguars (called tigers by the Rama): “When tiger run for the dog, them have a chance to kill it with machete [or] maybe with bow and arrow”.

Hunting is now a much-reduced source of nutrition for the Rama, with most purchasing their meat commercially. Even those families with livestock themselves tend to use it as a cash store, selling their flock at strategic points of the year for the best price and using the money to buy their own meat at a market.

#### 4.4.2.3: Rama farming practices

The Rama farm according to the most appropriate season for their crops. The climate, agricultural and economic calendar of the Caribbean Coast is shown in Figures 4.13 and Figure 4.14 (below). As can be seen, August is considered to be a small, additional dry season despite having quite a high level of rainfall. This is because there is a short period with light or no rains during August called Canicula (Brown, 2008). The rainfall during the rest of the month is very high.

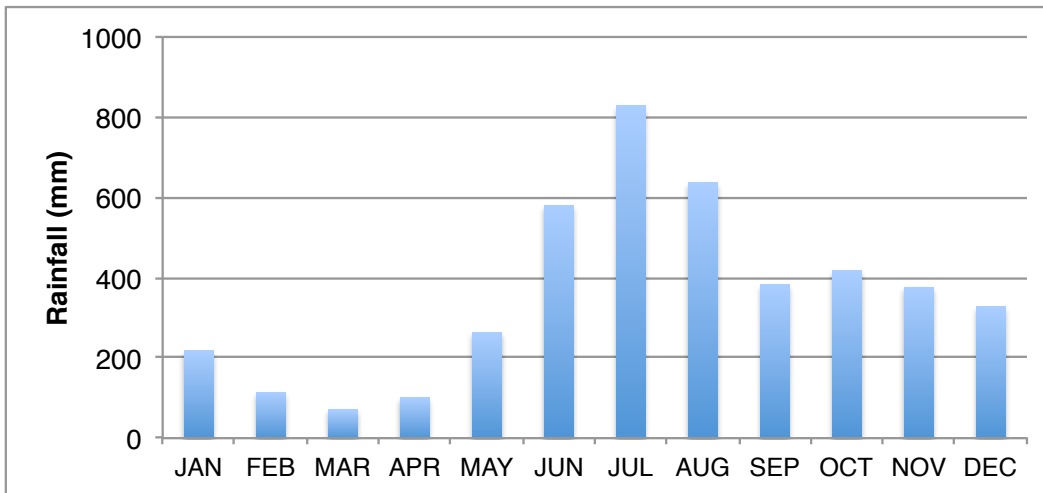
**Figure 4.13: Seasonal calendar of Nicaragua’s Caribbean Coast<sup>12</sup>**



Source: Adapted from Browne (2009)

<sup>12</sup> Note this calendar refers to the entire Caribbean Coast Traditional Fishing Livelihood Zone identified by the original HEA framework conducted by FEWS-NET and is therefore not specific to the entire Rama territory

**Figure 4.14: Rainfall in Bluefields**



Source: Hong Kong Observatory (2011)

The Rama plantations are located on the mainland within the Rama territory. The crops grown include the staple items of the Rama diet, such as beans, rice, cassava, coconut and bananas. Although items such as sugar and coffee were grown here previously (Hernandez and Thomas, 2012), I found no evidence this has continued. The Rama plant beans in January and harvest them in April before the rainy season that starts in May. The yields for all the crops the Rama plant are very climate dependent and this will be discussed in more detail in chapter six. The agriculture practiced by the Rama is artisanal and I found no evidence of the Rama using the industrial-scale techniques used by commercial farmers on the Pacific Coast of Nicaragua.

Livestock is also raised by the Rama on the mainland with cows being the most common animal. As previously stated, some families may also raise pigs but very few Rama eat their meat. Most Rama own chickens and they are raised close to their owner's houses in all three communities.

#### *4.4.2.4: Combining fishing, farming and hunting*

Many Rama families fish, farm, hunt or combine some (or all) of these activities as a significant part of their principle livelihood strategy. Those families that combine two or more of these activities focus on each different one according to when the season is the most appropriate as explained in the quote below.

“We work according to the time. Right now [February 2016], it’s time to work on agriculture, so most people are working in the farm right now. Some [of] them really is fisherman so them work specially in fishing and them not do any kind of partaking [on the] farm, but the majority of us work according to the time. When it’s time to plant [...] go plant; when it’s time to fishing, them come up fishing to them place.”

*Respondent #3*

#### *4.4.2.5: Different access to natural resources*

Fishing, farming and hunting are not conducted equally by residents across the three Rama communities. It is likely this is because of the difference in access that the three communities have to natural resources and, to a lesser extent, markets. The next two sections will outline these differences and argue this is one of the principle reasons why families who live on Rama Cay buy more of their food as a proportion of their total calorie intake than do families who live in the other two communities studied.

From the interview data, it was found that the residents of Rama Cay are more reliant on seafood than the residents of Sumu Kaat, whereas the residents of Sumu Kaat are more reliant on plant-based foods and plantation-based natural resources than the residents of Rama Cay. This difference is neatly, though perhaps too simplistically, summarised by Respondent #36: “What can we fish here [in Sumu Kaat]? What can they grow there [on Rama Cay]?” The answers that he gave to his own rhetorical questions were both “nothing”.

The residents of Sumu Kaat have poorer access to seafood than residents of the other two communities because the Kukra River is impassable during the dry season in a motorboat and there are few fish to be caught. The Kukra River at Tik Tik Kaanu is passable year round and the lagoon can be accessed relatively quickly from the community—30 minutes to two hours depending on the mode of transport.

The residents of Rama Cay eat a large quantity of mussels and cockles they collect from banks in the south of the lagoon. These food items are considered to be very important to Rama Cay households with many respondents naming them as the most ‘traditional’

Rama food they eat. Despite this, no evidence was found of residents of Tik Tik Kaanu and Sumu Kaat consuming these food items. It is likely that this is because these sources are a long way to travel for residents of these two communities. Having said this, it may be that the residents of these two communities do eat more mussels and cockles in seasons outside of the data collection period.

While the communities of Tik Tik Kaanu and Sumu Kaat generally have poorer access to seafood, they have better access to farmland. These two communities are situated within the Rama's plantations and cattle grazing areas on the mainland. Each household has at least some land surrounding it that is used to grow food on a small scale and keep animals (see Figure 4.15, below). In contrast, because of the population density of Rama Cay (see Figure 4.16, below), there is no cultivation or cattle raising on the island. In fact, cows and pigs are not allowed on Rama Cay for this reason. Rama Cay residents allow their animals to graze on the mainland on their farms, and on the island there are coconut trees and some families keep chickens.

**Figure 4.15: General view of Tik Tik Kaanu**



Source: Author



**Figure 4.16: General view of Rama Cay**



Source: Author

For the Rama living on Rama Cay, accessing their plantations can be difficult. For those with only paddle-powered dories, the journey between Rama Cay and their plantations can take more than a day of travel. This means a number of families only travel to their plantations every two weeks or so. For example, although the family of Respondent #S37 sells beans and breadkind from their plantation, they cannot always travel there as they don't have their own dory. In some instances, Rama Cay residents pay others to tend to their plantations because they have jobs or commitments elsewhere. Respondent #S49 has diversified her livelihood strategy by taking a job as a domestic helper for a family in Bluefields. Because of this she cannot tend to her farm and so has started paying two Mestizos to do this for her.

The production and selling of farm goods is therefore different for Rama Cay residents than it is for residents of the other two communities. For example, while no Rama Cay residents talked about regularly consuming or selling dairy produce, many families in the other two communities stated they produced cheese, cream and milk to sell.

These differences in access to the mainland between the different communities also have an impact on the Rama's access to other natural resources. For example, all the wild animals that are hunted by the Rama live on the mainland. One Rama Cay family said they set iguana traps in March, as that is when they breed, but I found no evidence of any Rama Cay residents hunting on a regular basis.

Seasonal migrations do complicate this generalisation about Rama Cay households having poorer access to farmland than those in the other communities. A number of Rama Cay household heads (n=12) said they travel to the plantations in January (during the school holidays) to plant the majority of their crops. It is reasonable to argue, however, based on the assertions of a number of people interviewed, that those living in Tik Tik Kaanu and Sumu Kaat are generally less mobile than Rama Cay residents. Residents of Sumu Kaat in particular tend not to move away from their homes to fish in the lagoon and sea during the rainy season, choosing instead to fish in the Kukra River.

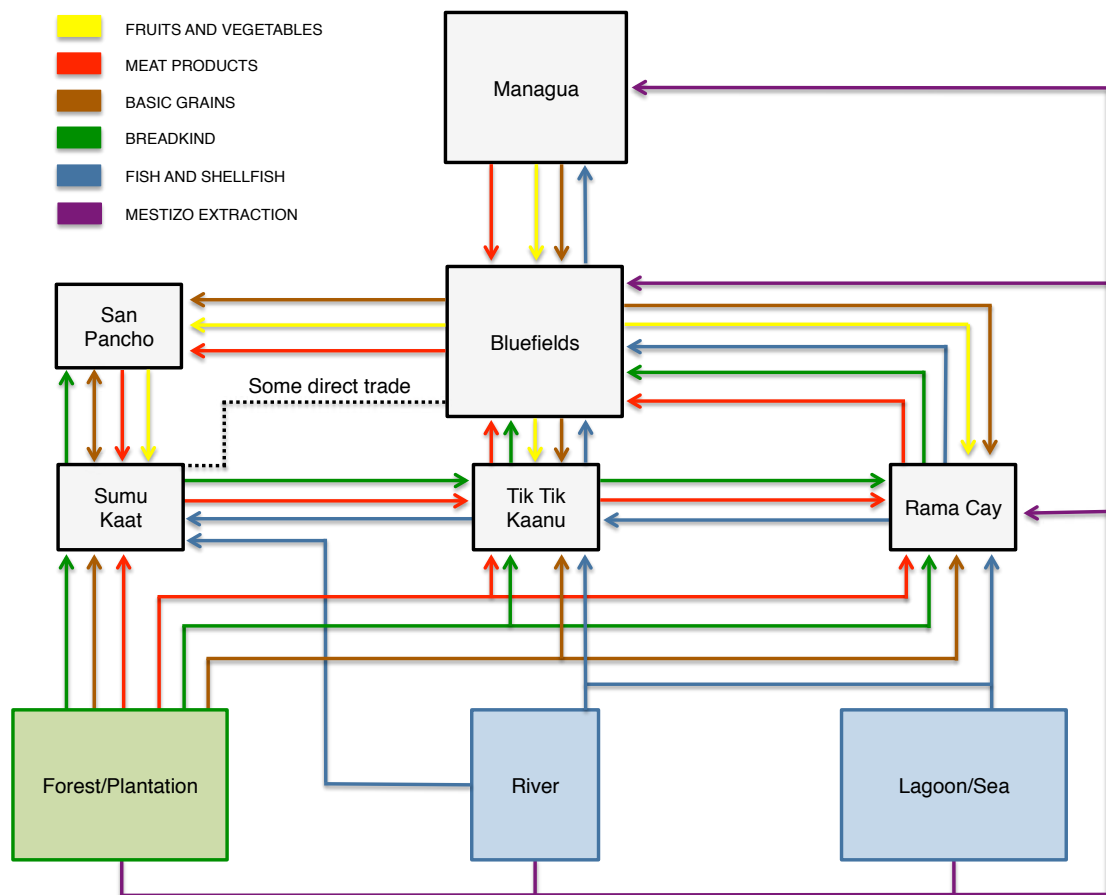
As argued in the previous section, the original HEA framework may not have picked up on these important differences between the three communities and even if it had, it may not have been able to explain them. All the Rama would likely have been placed in the bottom wealth group for the zone and the heterogeneity within and across the communities would have been missed. As was shown in the chapter, however, the adaptation of the HEA framework for this thesis was no better at accounting for seasonal differences and this is an important shortcoming.

#### *4.4.2.6: Different access to markets*

In the three communities studied it is unusual for families to only produce food for their own consumption without selling some. Only one family interviewed stated that they lived an entirely subsistence lifestyle and most Rama will sell their surplus food items should they have any. There is a wide variation in where these products are sold. Some families sell their food to other Rama families informally, either as an exchange or for cash whereas many will sell (and buy) their products in the major markets of the region. Figure 4.17 (below) shows a generalised flow of food products to and from the three communities in relation to important regional and national markets. This will be explained throughout this part of the sub-section.

Many Rama catch their own fish and sell it amongst themselves rather than buying it from markets. For all other food items though, they will buy them from the markets in Bluefields or elsewhere on the Caribbean Coast. Much of this food will have been imported from Managuan markets, which buy from Pacific-based plantations. They also sell food to markets on the Caribbean Coast depending on the season. Complicating this pattern is the Mestizos who farm and fish commercially within the Rama territory (labelled as ‘extraction’ on the diagram). Generally they will sell their items to the markets, but some of this food is also sold directly to the Rama.

**Figure 4.17: The general flow of foodstuffs between the studied communities**



Source: Author

Bluefields is the major market in the region and most Rama Cay residents travel there on a regular basis, with respondents typically saying they did so between once a month to multiple times a week. Those on the island who own businesses that rely on buying items from markets (such as a shop) travel to Bluefields most frequently (see subsection 4.4.3 for more detail). They buy from a variety of locations in Bluefields. These include the central market, shops like *Tienda Eddy* that are located close to the main wharf, favoured shops in particular neighbourhoods of Bluefields and from a small

market in the Santa Rosa neighbourhood in Bluefields, which can be easily accessed from the Lagoon using a canal. The reason most frequently given for travelling to Bluefields instead of buying products from other Rama on the island or elsewhere was that things are cheaper in the city, as explained by Respondent #6: “Sometimes when we have little money, for get it cheaper we go Bluefields”. Food is more expensive on Rama Cay because traders include the additional transport costs in the sale price.

Residents of Tik Tik Kaanu also travel to the market in Bluefields to sell their products and buy other food and non-food items. The frequency of visits appears to be lower than that of Rama Cay residents with respondents saying they typically travelled there once a month. Respondent #S97 said she only travels to the city three times a year. Residents of Sumu Kaat typically buy items from the small settlement of San Pancho, which is a three-hour walk or two-hour horse ride away during the dry seasons. It is a much more difficult trip during the wet season. Though there are regular bus and truck services running between San Pancho and Bluefields, the owner of the only shop in Sumu Kaat usually travels to San Pancho to buy products to sell. None of the respondents in Rama Cay or Tik Tik Kaanu said they bought or sold anything in San Pancho.

Buying food is cheaper in San Pancho than in Sumu Kaat, but more expensive than Bluefields. The price difference between Bluefields and Sumu Kaat is much greater than the price difference between Bluefields and Rama Cay. Because of this, as well as the relatively cheap cost of transport between San Pancho and Bluefields and the greater variety of goods on sale in Bluefields, Sumu Kaat residents do occasionally shop in Bluefields. For example, Respondent #27 said he goes to Bluefields once a month to buy beans. Respondent #36 gave an example of the price differences, explaining that a cold beer costs 60C\$ (US\$2.14) in Sumu Kaat, whereas the same product costs 22C\$ (US\$0.78) in Bluefields. These price differences may change because the new road from Managua to Bluefields currently under construction will pass close by San Pancho, making it more accessible from Managua.

There are a number of other reasons for Rama people to travel to Bluefields: some have family or sell to businesses there, and a few go to study. Four respondents – based in Rama Cay and Tik Tik Kaanu – said they (or someone in their family) study at one of the Bluefields universities. All of them, regardless of where they live said they travel to

Bluefields once a week for their studies, but they have to travel there and back in one day because of the cost of staying overnight in the town.

Some Rama sell to Mestizo or Creole tradesmen who travel to the Rama communities with the sole intention of buying their produce. A number of families tend to rely on these tradesmen when they are not able to go to Bluefields or San Pancho. These tradesmen more commonly travel to Rama Cay than they do to the other two communities because Rama Cay has a larger population and is more easily accessed from Bluefields. During the dry seasons when the Kukra River close to Sumu Kaat is not navigable by most boats, these tradesmen do not serve that community at all. Sumu Kaat farmers tend to sell primarily to other Rama during this time.

The prices offered by these tradesmen are much lower than the prices in the markets in Bluefields or San Pancho. Respondents #S96 and #36 said the price offered for food like cassava and plantain by the Mestizo and Creole middlemen is usually between one half and one third of what can be achieved in Bluefields. Respondent #36 said: “Them Spaniard [Mestizos] them making most money from our work”. Buying from and selling to these boats therefore represents a double disadvantage for those Rama who cannot travel to Bluefields on a regular basis. This predominantly affects Sumu Kaat as it is much less accessible than the other two communities. Living on Rama Cay is the most beneficial of the three communities in this respect.

As noted above, the residents of Rama Cay generally buy a higher percentage of the calories they consume than do residents of the other two communities. The reason for this might be due to the increased amount of contact that the Rama – particularly younger Rama – who live on Rama Cay have with Bluefields. As noted previously, more Rama are now studying at one of the universities in Bluefields or taking jobs in the city and other larger, communities in the region. Respondent #17 said that children no longer want to be fed traditional Rama foods, but instead prefer Western foods and specifically referenced the Tip-Top<sup>13</sup> restaurant in the centre of Bluefields. The quote below by Respondent #4 suggests this is because of the amount of contact they now have with Bluefields:

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<sup>13</sup> Tip-top is a Nicaraguan fast-food chain that sells Nicaraguan versions of the type of food normally sold in KFC or McDonald's restaurants.

“I think the Rama now not really like first [time]<sup>14</sup>. They quite changing too. Rama them [...] didn’t use to use lots of oil. [They used boiled] coconut here and just roast fish and sprinkle with salt, and boil breadkind and eat that. Now I give my kids that [but] they would not have [it]. I feel like it is because more people visiting Bluefields now and so when them come back they want to try it. Now when I go to Bluefields, my son say he want [to have] a piece of chicken, fried chicken. Yeah, it’s quite different!”

*Respondent #4*

#### *4.4.2.7: Summary*

This sub-section has explained the traditional livelihood strategies used by the Rama, including fishing, farming and hunting, and outlined the differences in the level of adherence to these activities between the three communities. It has argued these differences are due to the difference in access to natural resources (farming and grazing land) and markets.

Rama Cay households have better access to markets and seafood resources than the other two communities. Tik Tik Kaanu and Sumu Kaat households have better access to farming and grazing land and spend more time planting than Rama households. The sub-section argued this is part of the reason why Rama Cay households are more likely to buy a higher proportion of their food than households in the other two communities.

These differences mean that at certain points of the year, vulnerability will be stratified in different ways amongst the Rama. For example, Sumu Kaat will be more reliant on the functioning of the markets and favourable prices when the Kukra River is low and they are less able to catch fish. Concurrently, because Rama Cay households are more reliant on markets in general (because they buy a greater proportion of their food), they are more likely to be affected by market changes throughout the whole year than the other two communities.

The adaptation of the HEA framework used by this thesis allowed a more fine-grained analysis of the way in which the Rama acquire their food and this revealed these

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<sup>14</sup> Riverstone (2004) refers to the phrase ‘first time’ as being reference to an idealised golden age for the Rama. During this study’s data collection period, the participants appeared to also use it to refer to the past in general, or their own childhood

differences. It is possible that the original HEA framework would not have picked up these differences because of its reliance on a small sample size and because the Rama would have been considered to be a homogenous group in the lowest wealth grouping. This would have ignored the kinship and migratory ties between the three communities and the heterogeneity that exists amongst the Rama in terms of their chosen livelihood strategies. This latter point will be expanded on in the following sub-section.

#### *4.4.3: Non-traditional livelihood strategies*

This section will outline the livelihood strategies pursued by the Rama that can be considered non-traditional. These livelihood strategies are defined as non-subsistence activities where the end-point is the procuring of cash, which is then used to buy food.

##### *4.4.3.1: Newly-monetised activities*

Increasingly, some Rama catch or produce food with the primary intention of selling them to others for cash. Most sell their food informally, but some fishermen have contracts with national fish companies. These tend to be those Rama who have gill nets and can therefore catch enough fish to meet the company's requirements. While the selling of food in this way is not a traditional Rama livelihood strategy per se, it is reliant on being involved in traditional Rama activities. Selling food can be lucrative, but it is also seasonally dependent. For example, Respondent #10 said that their family was able to make 5,000-7,000C\$ (US\$178-249) per day selling prawns, but that this was only the case in September and October. Respondent #S19 said that their family sells coconuts, fish and cassava, with the earnings from just the latter being 9000C\$ (c. US\$330) every month. These two incomes compare to the average salary for a Rama teacher of about 4,500-6000C\$ (US\$160-214) per month.

Some families produce or harvest charcoal and/or lumber to sell on to buyers, who are generally Mestizo or Creole. Unlike the other livelihood strategies there is a clear gender divide: only men do these activities. None of the families who sold charcoal or lumber relied solely on this income. Both of these activities are difficult and can be dangerous. One Rama men who was interviewed had lost the sight in one of his eyes

after a splinter had got into it when he was chopping wood. Both men are now retired. Respondent #S25 said that charcoal is produced when there is little rainfall. It involves felling trees, burning them and then covering them with earth for three days. When the tree is being dug up again, the workers cannot drink or eat for the whole day because they could ingest impurities. Each tree produces around 30-40 sacks of charcoal and the final step is to carry these heavy sacks to where they can be sold on. Respondent #27 sells one sack for 25-50C\$ (US\$0.90-1.80) and sometimes only sells 20 sacks for the whole of September and October. He added that the Rama charcoal producers are being undercut by the Mestizos who sell lower quality charcoal for less and that most people in the region now use wood for cooking instead of charcoal. It is not legal for Rama Cay residents to cut down trees on the island, nor bring chainsaws or axes onto the island. Cutting lumber to sell and producing charcoal, therefore, are activities that can only take place on the mainland. As might be expected, the only two Rama interviewed who pursue this livelihood strategy were both non-Rama Cay residents.

Some families sell food and/or non-food products they have made themselves. The two most common products sold were bread and refrescos – powdered soft drinks made-up with water in small plastic bags and then frozen. A number of Rama were observed baking bread for sale within their community. Respondent #S16 said her family produces 100 bread rolls each day and sells them for 3C\$ (US\$0.11) each. After paying for the required ingredients, this family's profit will be approximately 200C\$ (US\$7) a day. Respondent #S29, who lives on Rama Cay, said her family sells less bread in January, February and March each year as people tend to be working on their plantations on the mainland during these months. As can be seen from these two examples, the baking of bread tends to be an activity managed by Rama women.

The most common non-food items produced by families to be sold to others were hand nets and dories. Respondent #20 says that making a 21-foot dory takes him about eight days to complete, including sourcing the tree trunk from the mainland. He charges 6,000C\$ (US\$214) for a 21-foot dory and 4,000C\$ (US\$142) for a 15-foot dory. Respondent #4 said that he makes wooden items like plates, bowls, and bows and arrows. He sells these items for between \$5 and \$50 and said that he can make about 1,000C\$ (US\$36) a month from this. Three families sell other items that they carve and/or construct from wood. Two respondents (#S43 and #S95) make furniture, including benches and tables that they sell to an intermediary in Bluefields who then



sells them in markets in Managua. For both, this was not a continuous income because the input costs – including tools, transport to Bluefields and the amount of labour required – were high.

#### *4.4.3.2: Buying and selling*

As mentioned, each community has at least one shop – there are six on Rama Cay, two in Tik Tik Kaanu and one in Sumu Kaat. The shop owners travel to Bluefields or San Pancho as frequently as 2-3 times a week (Respondent #31) or as infrequently as once every 10 days (Respondent #S40) to buy products including beans, rice, sweets, biscuits, crisps, bottled drinks, spices, flour, oil, batteries, and tobacco. They then transport them to their communities and sell each them “for 1C\$ more” (Respondent #13). Stated profits varied from c. 700C\$ (\$25) a month (Respondent #S18) to more than 3,000C\$ (\$107) a month (Respondent #31).

Other buying and selling is conducted through Mestizo or Creole middlemen, but two of the shopkeepers also buy Rama produce (principally fish) and then sell it on to others in Bluefields or at other markets.

“I would say that I make my money that way (.) the fish [...] I do just buy it and sell it to a company. [T]he rest of fisherman [...] they fishing but they not got place to sell.”

*Respondent #8*

Respondent #8 has benefitted through the contacts he gained selling his own fish to a company and through the connection he maintains with the Rama community as a result of owning a shop on Rama Cay.

#### *4.4.3.3: Employment*

Many Rama do work in exchange for wages. A few Rama do full-time, contracted work that usually requires the post-holder to have some form of qualification. This includes teachers who must take out a teacher’s licence, and nurses who must study for a nursing

degree at university. These requirements tend to exclude a lot of Rama because of the cost and/or difficulty of studying in Bluefields—with Rama students either having to pay for food and accommodation in the city, or relying on someone they could stay with while attending classes. It is not straightforward even for students from families with sufficient capital and relatives to stay with in Bluefields. Respondent #28 – who was a member of one of the more privileged Rama families – said her daughter was studying to be a nurse, but in order to be able to pay for her nurse’s uniform, she had had to interrupt her studies and take a job breaking rocks in El Bluff (further details of this employment are outlined below).

The salary for nurses and teachers is about the same at 4500-6500C\$ (US\$160-231) a month depending on experience and – in the case of teachers – whether they teach primary or secondary school classes. Some teachers said they felt their salary is not enough to cover their family’s expenditure. Those who have jobs like this tend to engage in other livelihood strategies, but the level of commitment they can give is restricted by their working hours. Respondent #25 pointed out that she can only go fishing on Saturdays because she is teaching during the week. It is possible, however, they have a greater network of contacts through their relationships with the parents of the children they teach, which may afford them some advantages.

A number of individuals work for local NGOs including FADCANIC<sup>15</sup> and blueEnergy<sup>16</sup>. One Rama man works for the Bluefields and Caribbean University (BICU), which runs an agricultural science lab in the community of Tik Tik Kaanu. I was unable to establish the exact requirements for these jobs, but all three individuals were well educated and well connected.

Respondent #S46 said her husband is a member of the regional council and his salary (an honorarium) is c. 1500C\$ (US\$53) per month. One respondent worked part-time as a maid for a family in Bluefields and was paid 3500C\$ (US\$125) per month. Although she agreed to be interviewed, she was always either absent from her home or unavailable and I was unable to interview her to establish more information.

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<sup>15</sup> FADCANIC (Fundación para la Autonomía y el Desarrollo de la Costa Atlántica de Nicaragua) is an NGO that aims to develop the autonomy process of the Caribbean Coast of Nicaragua through projects that promote diversity, sustainability and development

<sup>16</sup> blueEnergy is a French NGO that aims to build sustainable energy and water systems on the Caribbean Coast of Nicaragua

For most Rama, however, their work is informal and short term. The Rama call this type of work *chambas*—an informal Spanish word meaning job or work. Some of these positions may be contracted for a short period, but they are normally settled through verbal agreement only and often paid by results. As might be expected, the type of work, location, hours worked and the wages of these *chambas* are very diverse. The Rama employees may have their food and board covered by their employer, or be forced to buy these from the employer at an agreed rate out of their wage, or be compensated for their work only in food and/or lodging.

The most common *chambas* are farm-based tasks. Mestizos, Creoles or other Ramas employ Rama labourers to clear farmland so it can be planted, build animal pens, dig holes or tend to crops. For this they are usually paid about 100-150C\$ (US\$3.50-5) a day. Respondent #39 said that sometimes projects were conducted on a community basis, with the beneficiary of the labour promising the workers future help of a similar nature, but this didn't seem to be very frequent.

Both during the period when the fieldwork for this thesis was conducted and in the year beforehand, new houses were being constructed for the residents of Rama Cay. A number of respondents said they had been given *chambas* to work on these houses, with Respondent #55 saying he had been paid 1000-1500C\$ (\$36-53) a week. The leader of Tik Tik Kaanu confirmed the GTR-K (Rama Territorial Government) was hoping to build similar homes in the other two communities studied.

Respondent #15 spoke about being employed by word-of-mouth to break rocks for a Mestizo-run company close to the port of El Bluff. Respondent #15 said the work involves long days breaking rocks by hand, exposed to the elements. Labourers are paid according to the amount of rock they break, and because of the remote location where they work they have to rent expensive accommodation and buy expensive food directly from their employers.

“Out of the 9000C\$ (\$320) [per month salary you receive] you have to take out 5000C\$ (\$178) for the next month for all that you do [...] That's your pay: you spend it on the food!”

*Respondent #15*

The rocks are used for construction projects in the region. At the time of the fieldwork, the notable projects in the area were the new road from Managua to Bluefields and also the construction of a new lagoon wall on Rama Cay to help prevent flooding. Labourers were paid c. 300C\$ (US\$11) a day to work on the wall.

One family (Respondent #70) said she received a small payment for cooking food for the nurses who worked at the health centre. Respondent #18 said his family cooked food for the whole community to buy during local baseball tournaments. Although there are a number of baseball tournaments during the course of the year, this represents quite a sporadic source of income.

Respondent #21 sometimes washes other people's clothes, for which she is paid 150C\$ (US\$5) per load. She also minds other people's children, for which she is paid 100C\$ (US\$3.50) a day. Respondent #S89 said that sometimes the GTR-K were able to offer *chambas*, and Respondent #30 said that seafood companies occasionally employed Rama people directly to help catch lobsters.

The number of people in each community that do formal and informal work is very different. Respondent #7 estimated that about 20 percent of Rama Cay residents have salaried employment. On Rama Cay, there are 14 teachers in total – six of them are secondary teachers and the remaining eight teach primary – and one nurse who works in the health centre on the island. In Tik Tik Kaanu, three people were employed as teachers and Sumu Kaat has one primary school teacher.

As previously mentioned, four Rama individuals work for local NGOs and all are Rama Cay residents, whereas only the Respondent who works for the university in Tik Tik Kaanu has this type of role in the other two communities. Two individuals residing on Rama Cay work in political or organisational roles, and another is required to live in Bluefields for his role, but remits part of his income to extended family that live on the island. The husband of Respondent #S46 who works for the regional council is also a Rama Cay resident. In contrast, no resident of the other two communities receives a salary for roles of this nature. Sumu Kaat's two representatives on the leadership of the Rama territorial government (GTR-K) are both voluntary.

The main difference between the communities, however, is the number of *chambas* that residents of the three communities do. Most Rama Cay residents do informal, salaried work. At the time of the fieldwork, the most common roles were connected to the construction of the new houses on the island, but Rama Cay residents as a group undertook the full range of *chambas* that have been outlined here. Moreover, all the Rama Cay residents who are not employed in jobs or *chambas* sell self-produced items, buy and sell products for profit, or are supported by other family members who do.

This cannot be said for the other two communities. In Tik Tik Kaanu, Respondent #S89 said he did occasional *chambas* and Respondent #S95 said he had periodical work helping to prepare the land on other people's farms, for which he is paid 100C\$ (\$3.56) a day. There is some evidence that Sumu Kaat residents do *chambas* (informal jobs), but there are differences between the organisation and frequency of these roles in comparison to the other two communities. Respondent #S106 explained that Sumu Kaat men are employed in groups (usually around six men) by landowners to complete tasks such as chopping wood, building pens for animals and digging holes. Typically the contract pays 3-5,000C\$ (\$107-178) a month for all the men in the group, which is significantly less money than what residents of Rama Cay and Tik Tik Kaanu said they were paid for similar work. Respondent #S106 said that the last contract of this type was 10 months prior to when she was interviewed in May 2016. Most of the families in the community rely primarily on subsistence production from their land or livestock.

#### *4.4.3.4: Other non-traditional livelihood strategies*

There are a number of other ways that the Rama acquire money to buy their food that do not fit neatly into those listed above. Some families receive a significant portion of their income from remittances. Respondent #S36 said her brother works as a hotel chef in San Juan del Sur (on the Pacific coast of Nicaragua) and remits c. \$100 a month to her family. Respondent #S80 said his sister works in a restaurant in Managua who sends back between 500-1000C\$ (US\$18-36) each month. The sons of Respondent #20 work in a fish processing plant near the community of Pearl Lagoon (which is to the north of Bluefields). Due to the similarities between Standard English and Rama Creole, some Rama have found employment working on American and Canadian cruise ships in the Caribbean and remit their income home. This is fairly common amongst all the Creole-

speaking communities of the Caribbean Coast of Nicaragua (Pineda, 2006). Rama Cay was the only one of the three communities where some families stated they received remittances from family members who worked elsewhere in Nicaragua or abroad.

At least two Rama Cay-based families regularly offer board and lodgings to tourists or NGO staff. During the six-month fieldwork period, two individuals, one couple and one group stayed on the island for one night in each case. The families charged between \$5-10 (141-281C\$) per person per night. Some Tik Tik Kaanu residents sell food and provide lodging for the students when they are conducting fieldwork at the BICU site in the community.

The church network in the three communities provided food and support to some elderly residents who were no longer able to work or acquire their own food. As mentioned previously, one Tik Tik Kaanu resident (Respondent #12) lives on her own and has no immediate family, so she is entirely dependent on these donations.

Some families plug short-term money shortages by relying on credit – either in the form of cash loans or by buying items “on trust” from the shops and paying at a later date. Respondent #8 says that some families choose to rely on the cash loans he offers even before turning to the traditional livelihood strategies of subsistence production by hunting, fishing and farming. He said that families will borrow until they “reach their own limit”, and only then “[will] they go for other things”.

#### *4.4.3.5: Summary*

This section has explained the non-traditional livelihood strategies used by the Rama in the three communities studied. These include selling their produce (whether caught or cultivated), buying and selling items, selling items they have produced themselves, formal and informal employment, and other activities including living off the remittances of other family members.

It has shown there are differences between the three communities in terms of the extent to which these different livelihood strategies are available and used. The original HEA framework may not have been able to account for these differences. It may be that in the

face of a threat to food security, the strengths of a particular element of an individual's livelihood strategy is able to compensate for the weaknesses of the other elements. The HEA's focus on recognising difference only through a limited number of wealth groupings could miss this nuance. Having said that, the original HEA framework has greater emphasis on understanding how the labour market works quantitatively, which the adaptation of the framework used for this thesis was unable to do.

#### **4.5: Chapter summary**

This chapter has provided a fine-grained analysis of Rama foodways—the type of food they eat, how much they eat of each type of food, and how they acquire it. It is the first dedicated analysis of this kind. The chapter was based on Stage 1 (Baseline) of the Household Economy Analysis (HEA) framework, but the way in which the data were collected and the number of families surveyed was very different. This summary will outline the findings of the chapter and point to the advantages and disadvantages of the adaptation of the HEA framework used for this thesis.

The food items that most Rama families said they ate were rice, fish and beans, and this was also reflected in the relative contribution of these items to their diets in terms of the percentage of calories they provided. The survey data suggested only six of the families surveyed were consuming the amount of calories they should be consuming. These data were presumed to be inaccurate and this could have been influenced by the limitations of the surveys and/or the method used to calculate the calories, the fact that schoolchildren receive lunches at school, the respondents' omission of some food items (including packaged snack foods), and social desirability bias—the respondents may have wanted to exaggerate or under-report the amount of food they ate.

It is possible that the original HEA framework – based as it is on a small sample of respondents – would have been more effective at reducing these presumed inaccuracies. It may have been less effective at picking up the differences between the three Rama communities that were highlighted in this chapter.

There is a great deal of heterogeneity in how the Rama source their food, and (as a community) they do not follow subsistence lifestyles. Instead, they use an eclectic mix

of traditional and non-traditional livelihood strategies, from planting and catching food to taking professional jobs within the community, elsewhere in Nicaragua or internationally. These livelihood strategies are not discrete, with many Rama using a variety of different strategies according to their own abilities, resources or opportunities. Generally, those living on Rama Cay are more likely to rely more on non-traditional livelihood strategies than those individuals living in the other two communities. Evidence for this is most vividly displayed by the finding that the Rama on Rama Cay buy significantly more food than those Rama in the other two communities, who tend to rely more on food they have produced (grown), or that which has come from wild sources (caught or hunted). It is possible that livelihood strategies would be a more appropriate division than wealth groupings to differentiate between households when using methodologies like the HEA. This premise is explored in more detail in chapter seven, which shows how the ownership of different fishing technology can impact upon the success of livelihood strategies and affect long-term risk to food insecurity and inequalities within communities. The differences between the communities highlighted in this chapter (and shown in Table 4.1 below) are important for the arguments made in the rest of the thesis and so will be returned to in later chapters.



Table 4.1: The key differences between the three Rama communities studied

	<b>Rama Cay</b>	<b>Tik Tik Kaanu</b>	<b>Sumu Kaat</b>
<b>Wealth and income</b>	Qualitative data suggest that Rama Cay was the wealthiest community; Has the largest population	The survey data suggest that Tik Tik Kaanu residents are the wealthiest, though this may be due to data collection errors	The survey data suggest that no Sumu Kaat resident has any income, but this is likely to be due to data collection errors; Has the smallest population
<b>Amount of food</b>	Much less dairy consumed than the other two communities; More mussels and cockles eaten than the other two communities	Mussels and cockles barely eaten; Residents appear to eat more fish than those who live in the other communities	Mussels and cockles barely eaten; More beans eaten; The same amount of fish is eaten as by Rama Cay residents even though data were collected in the dry season when fish consumption is supposedly at its lowest
<b>Sourcing of food</b>	More calories bought on Rama Cay than the other two communities; Fewer calories coming from own production or wild sources	More calories coming from own production or wild sources than for those who live on Rama Cay; Fewer calories are bought	More calories coming from own production or wild sources than for those who live on Rama Cay; Fewer calories are bought
<b>Traditional livelihood strategies</b>	Rama Cay residents rely less on traditional livelihood strategies; Likely to dedicate less time to hunting and farming	Tik Tik Kaanu residents hunt more than Rama Cay residents; May dedicate more time to fishing than Sumu Kaat residents, but less to farming	Sumu Kaat residents may fish less than the other two communities; May dedicate more time to hunting and farming than the other two communities

Source: Author

Table 4.1 (continued): The key differences between the three Rama communities studied

	<b>Rama Cay</b>	<b>Tik Tik Kaanu</b>	<b>Sumu Kaat</b>
<b>Non-traditional livelihood strategies</b>	<p>More formal employment as the community has a large primary school, a secondary school and a health centre; Has better connections to employment opportunities in Bluefields; Slightly better access to higher education in Bluefields; More chambas available partly due to improved connections and also because of recent investment in the building of new homes on the island</p>	<p>Fewer formal employment opportunities than Rama Cay, but more than Tik Tik Kaanu; Has the university campus on site and more chambas available than for the residents of Sumu Kaat</p>	<p>No waged employment; Fewer chambas available than in the other two communities</p>
<b>Access to natural resources</b>	<p>Good access to cockles, mussels, the lagoon and the sea; Poorer access to farmland, pasture, hunting grounds and lumber</p>	<p>Good access to farmland, pasture, hunting grounds and lumber; Poorer access to cockles, mussels, the lagoon and the sea than Rama Cay, but better than Sumu Kaat</p>	<p>Good access to farmland, pasture, hunting grounds and lumber; Poorer access to cockles, mussels, the lagoon and the sea</p>
<b>Access to markets</b>	<p>Rama Cay residents travel more frequently to the markets in Bluefields than residents of the other two communities; Have access to boat tradesmen year round</p>	<p>Tik Tik Kaanu residents travel less often to Bluefields than do Rama Cay residents; Have access to boat tradesmen year round</p>	<p>Sumu Kaat residents travel less frequently to Bluefields and more frequently to San Pancho; Prices for buying and selling are worse in San Pancho than Bluefields; Don't have access to the boat tradesmen year round, but are more reliant on them and their less competitive prices</p>

Source: Author

## 5. Perceived threats to the Rama's food

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The previous chapter provided a general overview of Rama foodways, highlighted some of the differences between the three communities studied, and commented on the advantages and disadvantages of the original HEA framework and the adaptation used for this project. This chapter will describe and analyse the threats that the Rama perceive to their food. It represents Stage 2 (Problem Specification) of the Household Economy Analysis (HEA) framework.

Respondents were asked to identify the threats to their food through open questioning so they were not led to a particular response. The vast majority identified the weather as being the biggest threat. They also highlighted a number of non-weather/climate threats. The most commonly mentioned of these was the encroachment of Mestizos into the Rama territory. Many Rama said the Mestizos damage the natural resources in the territory, which reduces their abundance and quantity. Other threats identified include the unreliability of their own income sources – which prevents them from buying food or investing in their livelihoods – and the impact of the Rama's poor management of their waste.

The chapter shows how these threats identified by the Rama are interwoven, and have the potential to enhance or modify the impacts of other threats. This highlights one of the limitations of the original HEA framework: because of its use as a prediction tool, it only models one, specified threat in isolation. The chapter also shows that policymakers need to take into account how food security risk factors are interwoven.

The chapter is structured into two sections. The first section outlines the key weather and climate challenges as identified by the Rama. The second section outlines the other non-climate factors that were highlighted.

### **5.1: The weather and climate**

Out of the 38 individuals who were asked to name the threats to their food, 21 mentioned the weather as their first response, and of these 18 individuals categorically

stated that weather conditions were the biggest threat to their food. In total, the majority (34) of those asked (38) mentioned the weather as being a threat to their food.

This section of the chapter will outline what types of weather are perceived as a threat and for what reasons. It is split into two sub-sections based on the notion of the weather having direct and indirect impacts on food as outlined by McMichael, Woodruff, and Hales (2006), and Haines and colleagues (2006). Direct impacts are those where the causal pathway involves only the weather and its effect on food, whereas indirect impacts are those whereby the weather influences another factor that then has an impact on food.

### *5.1.1: Direct impacts*

This sub-section on direct impacts has two parts. The first is dedicated to the impacts of climate shocks, defined as major events such as floods, hurricanes and droughts, and the second is dedicated to other direct impacts.

#### *5.1.1.1: Climate shocks*

As noted in the introduction to this thesis (chapter one), there have been a number of serious weather events that have had an impact on food security in Nicaragua.

When respondents were asked to remember when the weather had affected them, most mentioned Hurricane Juana, which was a category four hurricane that hit Nicaragua in 1988, killing 148 people. Those Rama who were old enough to remember 1988 spoke about it in vivid detail and even those who did not experience it directly spoke about its impact on the Rama in general terms.

Before the hurricane hit, most Rama were evacuated from the Rama territory and moved into safe houses in Bluefields. The hurricane destroyed most of the houses on Rama Cay and brought down trees on the island and in all of the other Rama communities. Many of these trees blocked paths preventing some Rama from accessing their land on the mainland. Respondents #24 and #6 said that animals were killed and

the bodies of dead fish meant they were unable to fish in the lagoon for months afterwards. Respondent #4 described the lagoon as being like a “fish punch”. Respondents #5 and #24 said the Rama were reliant on Government food aid for at least a year afterwards. Respondent #3 said that the hurricane had been a major cause of a longer-term decline in the amount of fish in the lagoon, but added that the increase in gill net use was the key reason.

Some respondents believe that the hurricane has caused longer-lasting effects, notably the reduction in the number of animals they can hunt. Respondents #2, #5, #16, #18 and #24 said nearly all the waori were killed by the hurricane. Respondent #28 added that many Rama had moved and set-up new farms because the land they used to cultivate was “no longer good” after the hurricane. Three respondents had family members who had permanently migrated to different Rama settlements as a result of Hurricane Juana.

It is important to note, however, that some of these beliefs about the impact of Hurricane Juana will have been affected by the Rama’s memory of the event. The intertwining of memory and other non-climate effects may be the reason why many Rama believe the significant drop in the numbers of Waori on the mainland was because most were killed by Hurricane Juana. There has been a significant loss of expertise in hunting in recent years, as younger generations of Rama men have taken up non-traditional livelihood strategies (outlined in chapter four). This is particularly notable on Rama Cay where only one family said they hunted. It might be that this perception of the amount of animals living on the mainland comes instead from the reduced amount of hunting that takes place and the corresponding reduced visibility of meat acquired through hunting. In contrast, residents in Tik Tik Kaanu and Suma Kaat, where many families still hunt, talked about a reduction of animals after the hurricane rather than a collapse, and they largely attributed this decline to other factors that will be discussed later in this chapter. In addition, research by Boucher and colleagues (2001) shows that areas that have been cultivated for agriculture are less diverse than habitats affected by hurricanes, suggesting that the Rama’s agriculture may have been more damaging for the animals they hunt than natural disasters like Hurricane Juana.

Respondent #28 said that Hurricane Juana affected the quality of the farmland in the Rama territory, many people were unable to grow crops for more than a year, and their production didn’t recover to its previous level for around three years. She explained this

was partly because so many trees were felled by the hurricane. Respondent #5 said that many people moved location, often to different Rama communities entirely because their farms were destroyed.

Because the impact of Hurricane Juana was so extensive, it still looms large in the historical imagination of the Rama. This meant many Rama were unable to remember the specifics of the weather in recent years (whether or not they were good or bad years). Instead they were only able to say that the weather had never again been as bad as 1988. This initially made it difficult to understand the subtle ways in which the weather can affect the Rama's food.

After extensive prompting about other, or more recent events, some respondents talked about years other than 1988. By a number of accounts, the crop in 2015 was understood to be poorer than normal. Respondent #7 said the dry season was very long in 2015 such that it “come literally and it burn up the plants them: beans, corn [and] the banana get burn up [...] even the breadfruit you see all of them get dropped down from the trees”. Respondent #24 added that in July 2015 the wind had blown down many plants on the mainland. This meant that she and her family had lost their crop of coconuts and bananas and were forced to buy all of their food from shops. Respondent #S12 said that in 2015 the Canicula – a short dry period in August – had been particularly bad and they had lost their entire crop. These assertions show that climate shocks can affect the Rama's food quite frequently, but the catastrophic nature of Hurricane Juana meant that only a few Rama were able to give specific examples.

This section has shown that declines in the availability of food for the Rama may have been caused by multiple factors that even the Rama themselves struggle to attribute to one source. The adaptation of the HEA framework used for this thesis has enabled a more fine-grained analysis of the threats to the food security of the Rama and has shown that impacts can be attributed to multiple different causes. This may have been missed by the original HEA framework with its smaller sample size and focus on modelling one threat at a time. This point will be returned to throughout this chapter.

### *5.1.1.2: Other direct impacts*

Subtle changes in the weather, as opposed to large-scale weather events, can also have a big impact on the Rama's food. Many respondents spontaneously mentioned they had noticed the climate had changed, either by describing this change over time, or in some cases explicitly talking about the concept of climate change. Some Rama spoke about this in general terms, but most gave specific examples. Respondent #S20 said that now it rains quite regularly in March when it didn't use to. Respondent #6 (quoted below) also spoke about an increase in wet conditions.

“First time<sup>1</sup> in July time [...] in that time it be rain, yeah. When all this time I not see it like that. The rain that we have, it [change].”

*Respondent 6*

These changes have had an impact on the Rama's food. Previously, the Rama knew generally what the weather would be like in different seasons, but this is no longer the case. Respondents #4 and #S20 explained this has meant planning has become very difficult, with Respondent #4 saying that, “no-one know when to plant [...] not know what to do”.

If weather conditions are not ideal, the Rama may experience destruction of the crops they rely on.

“It bad because things happening now that never [did before]. The cocoa growing up and me cocoa burn and me never see that. With corn, [with whatever] the people grow, it burn them with the sun and the rain.”

*Respondent 12*

“People that work in agriculture well [...] if there's too much rain [...] everything die, so there is a great effect in several ways. For example like in November if you plant maybe corn or beans and if it stay so much rain then everything might die.”

*Respondent #3*

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<sup>1</sup> Riverstone (2004) refers to the phrase ‘first time’ as being reference to an idealised golden age for the Rama. During this study's data collection period, the participants appeared to also use it to refer to the past in general, or their own childhood

Most respondents said it is very unusual for all their crops to be completely destroyed, but they have all experienced losses of various magnitudes in recent years. As noted above, 2015 was quite difficult for farmers, but the dry season was also longer than usual in 2016 (Personal Observation, 2016; Respondent #2). Respondent #6 confirmed the crop had been poor in 2016 (when talking about the period from January until when the interview took place in March): “We not taking out the amount that we be thinking of [due to the] lack of rain”. A number of respondents described the magnitude of yield reductions they had experienced due to the weather and these are summarised in Table 5.1 (below).

Table 5.1: Examples of yield reductions due to poor weather

Respondent	Threat	Description
#6	Increased rainfall	When it rains, “maybe you [plant beans] and with that you expecting like 5 sack”, as opposed to when it is good when you might expect, “6 sack [of] 30lb each, so when it bad you can lose like maybe 1, 2, 3 sack, like good sack and maybe it burn and total burn you not get nothing”
#S12	Increased rainfall	Lost 50 percent of all crops planted (2015)
#S20	Increased rainfall	In a good year, they expect a crop of around 1000lb of beans, but could have less than 500lb in a bad year
#S35	Long dry season	Cassava: a good month would be about 10 sacks/month whereas a bad month would be about 1 sack/month
#38	Long dry season	When the sun is too hot: this year (2016) was a good year and the family had 8-9 sacks of beans, but in 2014 they only had 4 sacks of beans in the normal three-month harvest period

Source: Author

For those farmers affected in this way, the loss they experience is usually not just the loss of the crop itself and its contribution to their household food intake, but also the loss of the income they normally receive through its sale.

The rice and beans crop needs to be dried out before it is sold and unexpected rain can affect this process. Respondent #10 said that the rice turns black if it gets wet when it is being dried out. Whereas the normal price for rice she receives is 11-12C\$ (US\$0.39-43) per pound, the price she is offered for blackened rice is only 8C\$ (US\$0.28) per pound as it is “only suitable for chicken feed”. Equally, Respondent #9 said that the varied conditions in 2015 – with the rain and sun being more sporadic than normal – had an effect on the taste of the community’s breadfruit which meant the price offered to them was lower than normal. This highlights the importance of considering all the dimensions of food security, if vulnerability is only considered based on yields (the availability element of food security), these subtleties will be ignored. As a result of the



original HEA framework's use of calorie-based food budgets it is possible that it would miss this subtlety of the quality of those calories and their diminished market value.

As previously mentioned, for the households in Sumu Kaat, wetter weather means the water levels in the rivers are high enough for them to be able to fish, but Rama Cay residents also said they were affected. During the rainy season, the rivers become fuller and this extra fresh water runoff subtly adjusts the salinity levels of the lagoon, which has an impact on fish and shellfish. Respondent #11 said that when the lagoon water becomes fresher in the rainy season, the fish “don't like it [and] they all going out [to the sea]” so there is less fish for them to catch. Respondent #26 claimed that during the rainy season – particularly in July and June – the fresh water kills the oysters. Respondent #24 added that cockles are affected much less, but they are less favoured by the Rama and less numerous. This again points to the importance of not just considering the availability element of food security, which is privileged by the original HEA framework's focus on a calorie-based measure. While cockles provide similar amounts of calories, the Rama (generally speaking) would prefer to eat oysters.

### *5.1.2: Indirect impact*

Indirect impacts were determined by asking respondents what they think caused the non-weather threats they perceived to their food security. This section is therefore based on the respondents' view of the causal mechanisms of these threats. These are complex and interlinked with other factors and this will be discussed throughout this and the following sections.

The impact of the weather on fishing activities is predominantly indirect. One of the most noticeable indirect impacts of the weather on food highlighted by respondents was how certain conditions make it easier or more difficult to catch fish and other seafood. The possession of different fishing equipment can reinforce existing inequities in certain weather conditions. For example, some Rama are not able to fish when the weather is breezy because they rely on travelling in a dory propelled either by a sail or a paddle, whereas those who own boat motors do not have this problem. As a result of the added complexity of this finding, it is discussed in more detail in chapter seven. It is

unlikely the original HEA framework would have picked up on this finding because of its focus on quantitative and wealth group-based distinctions between households.

Pest infestations were one of the main threats to food security cited by the Rama and many respondents linked them to weather conditions. The Rama identified one specific infestation called 'Ongo' which they said was caused by excessive hot weather. Respondent #S53 explained that the Ongo had killed his entire coconut crop in 2013. Respondents #10, #S37 and #S38 also talked briefly about how unspecified infestations had damaged or destroyed their crops of beans, breadkind and corn respectively.

Pest infestations are recognised in the literature as being a major threat to food security, particularly due to their connectivity with climate, biodiversity and pesticide resistance (Rosenzweig *et al.*, 2001; Bruce, 2010; Thrupp, 2010; Gregory *et al.*, 2018). Having said this, due to the large variation in crops grown, pest species and local conditions, it is not possible to generalise about the impact of pests on food security (Rosenzweig *et al.*, 2001). For this reason, the fine-grained nature of this thesis's investigation of food security provides a useful starting point for more case study-based research to be conducted. Although in many contexts pesticides have been used to reduce crop losses from pest infestations (Bruce, 2010), none of the Rama respondents said they used them because they cost too much.

Respondent #S21 said that when the weather damages the beans and they are scarce, the price goes up in the markets in Bluefields, San Pancho and elsewhere. He was asked to estimate the variation in price and he said prices can be as high as 25C\$ (US\$0.89) per pound and as low as 15C\$ (US\$0.53) per pound in Bluefields. The price at the time of the surveys was 25C\$ per pound in Rama Cay and 19C\$ (US\$0.68) per pound in Bluefields. Evidently, given that many Rama purchase a high percentage of their food (as shown in chapter four), price elasticity is an important impact on food security. As was also noted in chapter four, some respondents have incomes that are considerably higher than their peers and so will be more able to absorb any price fluctuations, creating another stratification of vulnerability within the community. It is likely that the HEA would have been able to pick up on this based on the community being divided into wealth groupings, but it may not have been able to tease out all of the subtleties and interactions that are caused by price changes.

Respondent #S94 – a resident of Tik Tik Kaanu – said it is easier to hunt animals during the wet season. This is because the only reliable water source for animals during the dry season is a swamp. The swamp is a very long way from Tik Tik Kaanu and difficult to get to, so if the animals need to go there to drink, it is not as easy for the Rama to catch them. As a result, the increasing length and intensity of the dry season has also had an impact on the Rama’s ability to hunt.

## **5.2: Non-climate threats to food**

This section of the chapter will outline the factors that have an impact on the Rama’s food security that are not weather/climate-related. It is structured into two sections. The first section will talk about how the encroachment of the Mestizo into the Rama territory has had an impact and the second section will discuss the other factors that were highlighted by the Rama.

### *5.2.1: Mestizo encroachment into the Rama territory*

The introduction to this thesis explained that Mestizos have settled throughout the Autonomous Regions of the Caribbean Coast with their numbers growing extensively since the 1979 revolution (Morris, 2016). A number of respondents commented on this increase in recent years. Respondent #5, who spent most of her life living on the mainland, said she could remember when there were no Mestizos in the Rama territory, but she said, “now wherever turn, where you turn you find them”. It is also worth quoting Respondent #32 at length:

“[In] first time [...] Rama Cay [was] pretty because the lagoon was rich in all kind of natural resources but now it [is] very, very difficult. In the Atlantic Coast, in the whole region, the Spaniard [are there]. The Spaniard them must be over the [...] Rama: them tradition, culture, the land. [You see] them digging the lagoon, fishing day and night, every day.”

*Respondent #32*

According to the provisions of both international and domestic law the Mestizos should not settle or buy and sell Rama land (Anaya, 2005; Ley 445), but the process of *sanaemiento* – the actual delimitation, demarcation and titling of land – has not been completed for the Rama-Kriol territory and it is not officially policed.

This sub-section will discuss the ways in which this Mestizo encroachment into the Rama territory has had an impact on the Rama's food security. It is split into three parts. The first is focused on land use, which will discuss the various ways that the Rama believe Mestizo land practices represent a threat to Rama food. The second part will discuss the Rama's belief that the Mestizo's fishing practices have reduced fish stocks. The third part will summarise and reiterate why the exploitation of the territory's resources by the Rama and the Mestizo should be treated differently.

#### *5.2.1.1: Land use*

More than 20 respondents described at length the way some Mestizos have taken over the farms of Rama people through force, often with the use of guns. This forceful removal of some Rama is best summarised by the quote below.

“In the woodland we have say people coming in, taking your land without consultation and they do whatsoever they wanting to [...] We see that a lot. The whole territory is invade by [Mestizos].”

*Respondent #7*

Some of the Mestizos come to fish, hunt or establish farms in the territory. Others use the land to raise cattle, often cutting down or burning trees to do so (Respondents #2 and #6). The arrival of Mestizos to conduct these activities has had four impacts on the Rama and their land.

Firstly, the Mestizo colonisation reduces the amount of land and natural resources that the Rama themselves can exploit. The residents of Tik Tik Kaanu and Sumu Kaat have felt this most keenly. One Sumu Kaat resident (Respondent #36) said that in the future, his community will be a fraction of its current size if the current pace of Mestizo settlement continues. This is important because the Rama aim to rotate the land they use

to maintain its productivity, but some are now forced into using the same plots continuously, exhausting the nutrients from the soil (Respondent #19). Respondent #19 adds that this is exacerbated by the intensive way some Mestizos farm, which is based on short-tenured exploitation, meaning they exhaust the land over a period of 2-3 years and then sell it on to other Mestizos and move elsewhere.

Secondly, the destruction of habitat for cattle grazing and other activities has meant crop pests no longer breed in the cleared areas and so become more concentrated in plantations, including the ones still belonging to Rama households (Respondent #10). Respondent #10 adds that the Mestizos who do plant crops use too much pesticide to combat this problem and this damages the Rama's banana crop.

Thirdly, this increased competition for land has led some Rama to alter their livelihood strategies. Respondent #22 said his son-in-law was looking for work breaking rocks in El Bluff because "some other people harvested the plantation [...] They go on and steal so [...] now he [has to do] other work."

Finally, the reduction in the amount of woodland through 'slash-and-burn' practices has damaged the habitat of animals traditionally hunted by the Rama (Respondent #5). These animals have been forced into areas that are a long way away from Rama settlements, making them more difficult to hunt regularly. Respondent #26 added that the Mestizos have killed so many animals like this in such a short timeframe that the populations have collapsed. As was noted in sub-section 5.1 of this chapter, this was attributed to Hurricane Juana by a number of respondents and was claimed to be a consequence of longer dry seasons by Respondent #S94. This reiterates the point that certain threats to the Rama's food security have multiple causal factors, and it is important therefore to have a fine-grained understanding of these. While the original HEA framework is able to model specific threats and their impacts, it is less able to unearth what these different threats are and the way they might have unequal effects within communities.

Four Rama respondents ascribed these poor land management practices that increase crop infestations, remove the nutrients from the soil and damage animal habitats to the Rama rather than the Mestizos. Respondent #3 said: "We [...] work the same bit over and over. Maybe the land is too old and this causes the plaga [pest infestations]."

Following the view of Riverstone (2004), it is reasonable to argue, however, that the reason why the Rama have to work the same land continuously is because so much land has been taken by the Mestizos.

Respondent #S94 said that the Rama also work the land too much to the point where it “gives nothing”, but said that this over-work was often connected to the crop failing due to poor weather. Respondent #8 also shared this view and particularly mentioned the cutting down or burning of trees or crops as reducing the land’s productivity. There was extensive evidence of this practice within the community of Sumu Kaat during the fieldwork period, though it was unclear who was responsible. Finally, Respondent #30 echoed the previously presented views about tree removal meaning animals have moved to other habitats thus making it more difficult to hunt, but she believed this was also the fault of the Rama because they have cut down trees to burn for charcoal or to clear areas to cultivate or raise cattle.

There is a clear difference, however, in that the Rama has the right to exploit these resources by law, whereas the Mestizos do not. This point will be discussed in detail in the final part of this sub-section (5.2.1.3).

#### *5.2.1.2: Overfishing*

All the respondents said the amount of fish in the lagoon, sea and rivers had reduced in recent years. The respondents who blamed this on the Mestizos made two accusations about Mestizo fishing practices. The first is that – unlike the Rama – the Mestizos do not limit the amount of fish they catch just to what they need for personal consumption. This assertion was based on the belief that the Rama only ever catch enough for their own consumption, whereas the Mestizo only fish commercially. For example, Respondents #3 and #30 said the Rama only catch prawns during the day and only take what they need, whereas the Mestizo fish throughout the day and night. Respondent #S43 said this is also true of crabs, which are now much reduced, and Respondent #4 said “[Mestizos] have no limit” when they collect cockles too; an assertion that is also supported by Respondent #7.

The second accusation was that the Mestizo use equipment and techniques that are destructive to fishing stocks. Respondent #3 said the Mestizos introduced gill nets to the region and they all use them. These catch smaller and younger fish, which causes fish stocks to collapse because they are caught before they can breed. Respondent #12 insisted that no one who lives in Tik Tik Kaanu owns a gill net, but that the Mestizos put them across the Kukra River which reduces the amount of fish able to swim to the parts of the river nearest the community.

Respondent #37 said that because there is a lower price for smaller prawns, the Mestizos often throw them back into the lagoon after they have died. He believes the impact of these dead prawns being returned to the water has dramatically reduced yields. He says that he used to go fishing and catch 60-100 pounds in one day, whereas now he can only catch 5-6 pounds on a good day, and none at all if he is unfortunate. Four respondents claimed the Mestizo used poison and dynamite to catch large quantities of fish at once. Respondent #19 asserted, "They just [...] poison the river. They couldn't care. [They take] 2-3 quintile [and] leave behind [the] spoil[ed] fish,"

Equally, all Mestizos use motor-powered boats, which can afford them significant advantages over most Rama fishermen (see chapter seven for more details). These accusations suggest the Mestizos are also violating property rights of the Rama by flouting the accepted principles of how these resources should be extracted.

As with the previous part of this sub-section, the Rama also do some of the same activities they accuse the Mestizo of doing. As noted in chapter four, a number of Rama own gill nets (although Respondent #2 argued that the Mestizos use nets with a much finer mesh), and some fish commercially. Respondent #3 said he believed as much as 30 percent of the Rama Cay population owned a gill net. Respondent #8 said that the Rama are also guilty of catching the smaller fish which he believes is the main reason fish stocks have collapsed. Respondent #12 adds that there used be a lot more fish in the past when all the Rama used to catch fish with a hook. Although there is no evidence the Rama string their nets across rivers or use poison or dynamite, it is safe to say that some Rama are contributing to the over-exploitation of these resources.

There is a clear difference, however, in that the Rama has the right to exploit these resources by law, whereas the Mestizo do not. This point will be elaborated on in the following part of this sub-section (below).

### *5.2.1.3: Distinction between the Rama and the Mestizo*

As illustrated in the previous two parts of this sub-section, many Rama claim that the Mestizos are poor custodians of the natural resources even when some Rama are doing the same thing. Respondent #7 is not alone in insisting the Rama are not to blame, saying: “Is not destroyed [by] the Rama we. It’s people from out. Them destroy it a lot”. This rhetoric could stem from wanting to show practical reasons why the Mestizo should not be there (given the present heated debate about the issue), or it could stem from ignorance about what other Rama people are doing. It could also be the case that only a few Rama are considered poor custodians of the territory’s resources, whereas all the Mestizos are. To further understand this rhetoric, however, it is important to reiterate that according to international and domestic law (outlined in chapter two), the Mestizos are exploiting these resources illegally. The Rama have the right to use the resources in their territory as they see fit under the provisions of Law 445 and international law, whereas the Mestizo have no right to do the same. The reality on the ground, however, is that the territory is not policed because the national and local administrations do not have sufficient resources.

Conflicts such as this present a challenge for both food security researchers and policymakers, and the food sovereignty movement (outlined in the literature review). Food security has generally not focused on local access issues (Gleick 2014; FAO, IFAD, UNICEF, WFP & WHO, 2017; Bini 2018), and the food sovereignty movement<sup>2</sup> is less clear on how disputes over the ownership of resources can be addressed (Wittman *et al.*, 2010). In fact, a key criticism of the food sovereignty movement is that it says very little about how to achieve its stated aims (Clapp, 2014). Regardless, fine-grained research similar to this project is critical because contextual issues such as these are able to expose the tensions that exist between food security scholarship and food security policy (with the latter’s current focus largely on boosting production), and the

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<sup>2</sup> The food sovereignty movement is focused on ensuring people have the right to produce, consume and share their own food (Wittman *et al.*, 2010; Lang and Barling, 2012; Bini, 2018).



merging, or complementarity of the food security and food sovereignty discourses (Jarosz, 2014). Food sovereignty, for example, gives no clear direction when resources are being contested and this is particularly important with future threats such as water and land grabs, population pressure and climate change (Wittman *et al.*, 2010).

It should also be noted that it is unlikely these issues would have been considered by a study that relied on the original HEA framework. This is because the HEA relies on classifying large areas into separate Livelihood Zones and then differentiating within these zones based only on relative wealth groupings. It is likely that in this case, Mestizo landowners and farmers would be placed into a different wealth grouping from the Rama. Not only would this have obscured the heterogeneity within the Rama community, it may also have missed the political economy-based factors that govern interactions between these two groups. The importance of the Mestizo encroachment into the Rama territory for Rama food security may have been missed, or its importance may have been diminished.

#### *5.2.2: Other non-weather/climate threats*

The two other non-weather/climate threats that should be highlighted are lack of income and how the Rama manage their waste. These are outlined below.

##### *5.2.2.1: Income*

Seven respondents cited a lack of income as being the biggest – or one of the biggest – threat(s) to their food security. This was principally based on a shortage of jobs, or well-paid jobs. All seven of these respondents lived on Rama Cay. As established in the previous chapter, a large proportion of households on Rama Cay acquire their food through earned income, so this is more likely to be keenly felt by residents of the island. Respondent #37 said that those who do not have work have the most difficulty getting food. Respondent #30 added that she is still not paid enough as a teacher to be able to afford food out of term-time when she is not paid.

When Rama Cay residents were asked how their lives could be improved, most said the community needed more jobs. For those who live on Rama Cay, it appeared as though there were reasonably frequent opportunities for short-term ‘chambas’. Some respondents, however, felt as though the Rama leadership controlled access to these short-term roles. This opinion was even stated by those with chambas or formal employment themselves. Respondent #19 said that short-term work was not spread around the Rama community fairly, claiming work was always just given to the ‘special people’ who had favour with the Rama leaders. Respondents #4 and #15 repeated this idea of certain Rama being considered ‘special’ and given particular advantages with respect to employment opportunities. I didn’t find any evidence to suggest that even those families who were evidently disliked by some of the leaders were excluded from the work opportunities that were available during the fieldwork period, but this was certainly a commonly held view.

Fluctuations in income by season are also an important consideration. The most obvious example of this was the prawn fishermen who can have large incomes for very short periods of the year and then nothing for the rest of the year<sup>3</sup>. The seasonal aspect of other people’s livelihood strategies can also cause problems for those who supply items to other Rama. Respondent #S29 said that they sell less bread between January and March because people are spending more time on the farms than they do on Rama Cay.

Lack of a steady income reduces households’ ability to buy food, but can also increase the cost of food for those who don’t have transport of their own because they have to pay others “the pass” to Bluefields, meaning they are more exposed to the higher prices for goods in the Rama communities (mentioned in chapter four).

One of the major problems with the HEA framework is that it is less able to account for seasonal differences in food consumption – the stability element of food security – because it depends on a snapshot of data. The HEA uses a reference year as a baseline year so if this is a particularly poor or particularly good year the baseline will be “false” (Boudreau, 1998; Holzman *et al.*, 2008). This limitation has not fully been addressed by the adaptation of the HEA framework used for this thesis, but data were collected over a

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<sup>3</sup> The empirical data showed that, as might be expected, the prawn fishermen use alternative livelihood strategies during the rest of the year

much longer period and from more respondents who were all asked to comment on seasonal variance as with the original framework.

#### 5.2.2.2: *'La basura'*

As mentioned previously in this chapter, many of the accusations of poor resource management – particularly relating to overfishing and land use – are aimed at a Mestizo other. A few Rama, however, also pointed out that the Rama themselves should be more careful about their own practices.

Respondent #20 spoke at length about the impact of household rubbish on fishing yields, saying: “When you throw so much basura [rubbish] in the lagoon, the fish come scarce”. He believes this is the biggest impact on fish, with a typical catch being reduced from 100lb to 10lb when flooding causes the rubbish to come down from the river. The rubbish he mentioned included farmers putting dead animals into the river, which then float into the lagoon. He claimed that the fish and crab can detect the scent of the dead animals and they then move away from where the Rama normally fish.

Respondent #22 said that the lagoon has been contaminated by sewage and rubbish from Bluefields and this was a key reason for the reduction in fish yields. Anecdotes from conversations I had with other Rama and with Bluefields residents strongly support the assertion that sewage is deliberately disposed of into the Bluefields Lagoon. This effect can be amplified during the wet season when rainwater floods into the Lagoon (Respondent #20).

### **5.3: Summary**

This chapter has presented what the Rama believe are key challenges to their food security. It represents Stage 2 (Problem Specification) of the original HEA framework. The most important factor is the weather and/or climate conditions. The many ways in which these affect food security (both directly and indirectly) were outlined. The chapter also highlighted the other intervening impacts that are important in influencing food security or mitigating the relationship between the climate and food. The most

significant of these factors is the Mestizo encroachment into the Rama territory, which has been claimed to add pressure on seafood stocks and farmland.

The impact of Hurricane Juana (Joan) in 1988 on the Rama's food (and overall livelihoods) was so severe that many Rama still consider it to be the most significant weather/climate impact on their food security. This is because many Rama believe the hurricane had a profound affect on the short- and long-term abundance of resources in the Rama territory. This chapter shows it is likely that there was a more nuanced interaction of multiple factors – including the hurricane, climate change, the encroachment of the Mestizo into the Rama territory and the loss of hunting expertise – that caused the reduced abundance of resources that has been witnessed since 1988.

Other climate/weather factors were discussed. For example, increased variability in the amount of rain and when it arrives each wet season can affect the Rama's crops directly by reducing the quantity or quality of the crop they produce. Five different scenarios showing how certain weather conditions can impact on yields were highlighted. Produce and wild food can also be affected indirectly through infestations and market prices. Seafood can also be affected by the weather, be that through the levels of salinity in the rivers and lagoon, or by impacting on the Rama's ability to acquire fish.

These effects are also mediated by other factors – principally the Mestizo encroachment into the Rama territory. The Rama (with plenty of evidence) accuse the Mestizo of exhausting the farmland in the territory, over-hunting the animals the Rama hunt, and over-fishing using thin-mesh gill nets, gun-powder and poison, which kills the youngest fish and causes the populations to collapse. Although this chapter has shown the Rama may also follow some of these practices, they are legally entitled to exploit their territory through the provisions of Law 445 and international law whereas the Mestizos are not. This dispute is, therefore, an important case study to be considered by the food sovereignty movement—if the focus is on ensuring all people can control their own food supply, how can resource disputes such as these be mediated effectively in poor countries with weak institutions?

The chapter has highlighted some of the shortcomings of the original HEA framework. The key weakness stems from it being a predictive tool rather than a way to comprehensively study food security. This means that it is focused on understanding the

impact of one particular, identified threat to a community's food security rather than understanding the interaction between threats and their causes.

The data from the semi-structured interviews most clearly showed this shortcoming as they highlighted multiple potential causes for the collapse or reduction in number of animals hunted by the Rama (notably the waori). It is possible that the population of animals hunted by the Rama have declined as a result of Hurricane Juana, or climate change (both directly or indirectly), or overhunting by either the Mestizos or the Rama, or the removal of habitat due deforestation, or a combination of all of these factors. It could also be argued that the Rama's perception of the animal populations have been altered as a result of fewer Rama choosing to pursue hunting as a livelihood strategy and thus reducing the amount of hunted meat available in the communities.

Secondly, the original HEA framework's reliance on calorie budgets mean that only the availability element of food security is privileged and the access and utility elements may be ignored. For example, it would not have been able to pick up on the impact of the precipitation levels on the quality of rice, which has an impact on its market price.

Finally, the chapter highlighted the problems that can be caused by only considering differences between households in terms of wealth groupings and calorie budgets. There are many factors that could create significant differences in vulnerability between Rama households that would not be highlighted by these two factors, including personal taste, perception of risk, cultural differences and access to resources that are important for livelihood strategies.



## 6. Impact of the weather on Rama food

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This chapter will model the potential impact of the climate shocks and weather events – identified by the Rama in the previous chapter – on the community’s baseline calorie budgets provided by the dietary recall data. It represents part of Stage 3 (Impact) of the Household Economy Analysis (HEA) framework used by this thesis. The previous two results chapters have provided the baseline and the problem specification stages of the HEA. Chapter seven, which follows, is a qualitative explanation of the impact of the weather on Rama fishermen, which also forms part of Stage 3 of the HEA.

The chapter makes two key contributions. The first contribution of the chapter is to demonstrate that the Rama’s vulnerability to food insecurity is high. The second contribution is that it shows that there is considerable heterogeneity in the level of vulnerability that different families have to the same threat, even if they were likely to be included in the same wealth grouping in the original HEA framework. This second contribution shows that the original HEA framework may have been unable to pick up on the difference shown here. The chapter also shows, in tandem with chapters seven and eight, that the original HEA framework is unable to take into account other risk enhancers and modifiers, as it is focused on modelling just one threat. The following two chapters will highlight the important factors that food security studies need to be aware of, including differences in access between households and changes in entitlements due to larger social processes such as the Mestizo encroachment.

The chapter will use the dietary survey data for the modelling process. As mentioned in chapter three, these data were collected to provide a more detailed look at Rama food because the household surveys were unable to show the daily fluctuations such as food prices, personal preferences and cooking methods. While the household survey data asked families what food they normally eat, the dietary surveys asked nine families exactly what food they ate over a four-and-a-half week period between 17 February and 18 March 2016. The methodology chapter (chapter three) explained in depth how these families were selected and the process of data collection.

Four of the nine families whose data were collected by the dietary surveys were chosen and three weather scenarios were modelled onto their responses to the dietary survey to

determine the impact the weather could have on their calorie budgets. The three weather scenarios were taken from the results presented in sub-section 5.1.2 of chapter five. Section 6.3 of this chapter will explain in detail how the four families and the three specific weather scenarios that were modelled were chosen.

The chapter is structured as follows. The first section will briefly reprise the changes that were made for this project to this stage of the HEA. The second section will describe the basic descriptive statistics of the dietary survey data. The third section of the chapter will explain how the data were adjusted for modelling so the separate families could be compared to one another. The fourth section will describe how the four families and the three weather scenarios to be modelled were chosen. The fifth section of the chapter will outline and discuss the results, and the final section will summarise the chapter.

### **6.1: Changes to the Impact stage of the HEA**

As explained in the methods section, the original HEA framework has a number of limitations, of which two are relevant to the Impact stage. Firstly, the data is collected in focus groups which increases the chance that it is subjected to recall and social desirability biases and means the data does not reflect daily differences. Secondly, it is not set-up to consider wider contextual and more individual forces that act on food security including culture and individual perceptions and motivations that might have an impact on livelihood strategies. These limitations mean the original HEA framework is unable to provide the fine-grained, in-depth analysis of the food security of the Rama provided by this thesis.

The methods used to collect the data presented in this chapter (dietary recall data) helped to address the first limitation because the chance of recall bias was reduced and daily fluctuations could be accounted for better. For a more detailed explanation, please refer to sub-section 3.2.4 in chapter three. The second limitation was addressed in this study by conducting in-depth, semi-structured interviews; the results of which were presented in chapter five and will also be detailed in the following two chapters.



## 6.2: The dietary survey data

The dietary survey data were collected from nine families and the key statistics are shown in Table 6.1 (below).

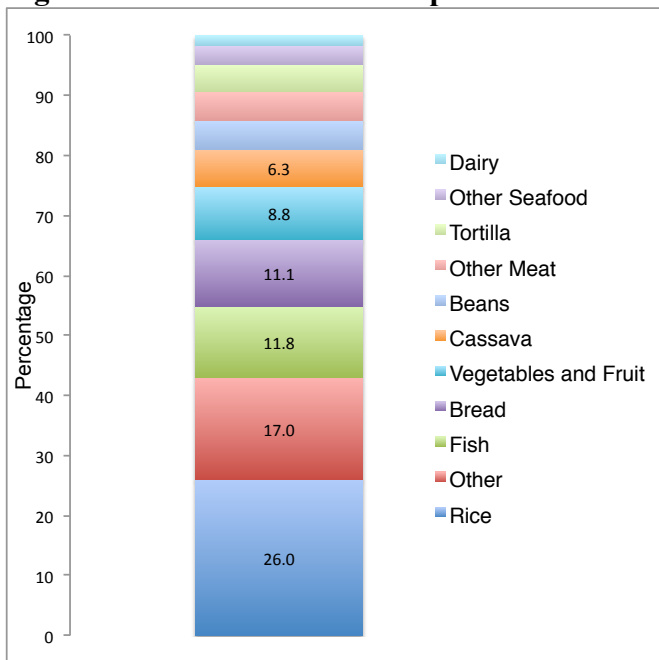
Table 6.1: Key dietary survey data collected from each family

Family ID	Days Collected	Daily Income (C\$)	Daily Food Spend (C\$)	Daily Calorie Intake	Daily Calorie Requirement
#11	9	Data refused	142.44	11916	26700
#14	21	118.36	49.36	5754	32000
#17	22	255.76	85.68	5263	35500
#28	19	375	40.53	3971	16500
#46	10	97.92	75.45	3914	13100
#58	8	131.51	88.63	3056	6500
#60	14	Data refused	74.04	3848	10600
#77	24	Data refused	90.33	6853	12900
#78	20	80	72.10	5787	9800

Source: Author

Daily income data were not provided by Family #s 11, 60 and 77. The daily food spend data shown here was calculated by asking respondents how much each food item cost if they sourced it by buying it. These declared daily spends on food are still below the 150-200C\$/day spend stated by those Rama who attended the feedback meeting on Rama Cay (see Section 4.3 of chapter four), but are higher than those suggested by the household surveys conducted on Rama Cay, which suggests these data are more accurate. The calorie requirements were taken from the number of household members as described in the methodology chapter (sub-section 3.6.1). Figure 6.1 (below) shows what food was eaten by the families who completed dietary survey data.

**Figure 6.1: Calories consumed per food item as a percentage of total calories**



Source: Author

As with the data from the household surveys, fish and rice were the most commonly eaten individual items. The dietary survey data, however, suggests Rama families source more of their calories from rice than they do from fish, which is the opposite of what the household surveys suggested. This may be because fish was more difficult to catch during the dietary survey collection period so families relied more on rice (see chapter seven for a possible explanation).

The second highest contribution to these families' calorie budgets was 'Other'. This included food items such as: biscuits, soup, instant noodles, cakes, chocolate and dumplings. It may be that the Rama diet is more diverse than suggested by the household surveys and this also corroborates some of the arguments made in chapter four (Section 4.3) about the reasons why the amount of food being consumed by the Rama (as recorded by the household and dietary surveys) is lower than their calorie requirements. This discrepancy, in relation to the household surveys, may be because these asked the Rama what food they normally ate, so they may have left out snack foods or more unusual, rarely eaten foods.

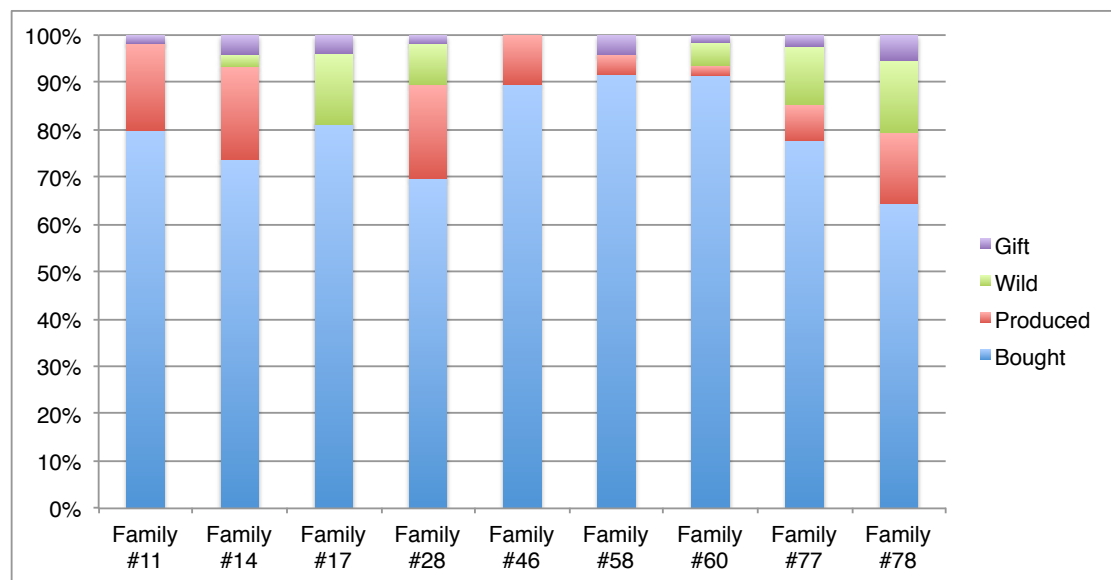
Bananas were the fifth highest contributor to calories for the Rama according to the household surveys, but the dietary surveys suggested families did not eat it at all during the data collection period. Again, this may be due to seasonal differences as although

bananas are grown year round, beans may be more favoured during the period when data was collected as this is when they are harvested.

Finally, bread was the fourth highest contributor to the families' calorie budgets according to the dietary surveys. This is in contrast to the household surveys when it was not mentioned. This may be because – as stated in the methodology chapter (chapter three) – some Rama families did not feel as though they had eaten breakfast if they had only eaten bread and so they did not mention it in the household surveys. For the dietary surveys, however, respondents were asked exactly what they had eaten on a particular day, and were prompted meal by meal, so would have been more likely to include what they had for breakfast.

As with the household surveys, all families were asked how they acquired each individual item of food they ate. This information was tied to the calculated calorie contribution of each food item to determine what percentage of their total calories came from each of the four sources: Bought, Produced, Wild and Gift. Figure 6.2 (below) shows this information.

**Figure 6.2: Source of calories as a percentage of all calories**



Source: Author

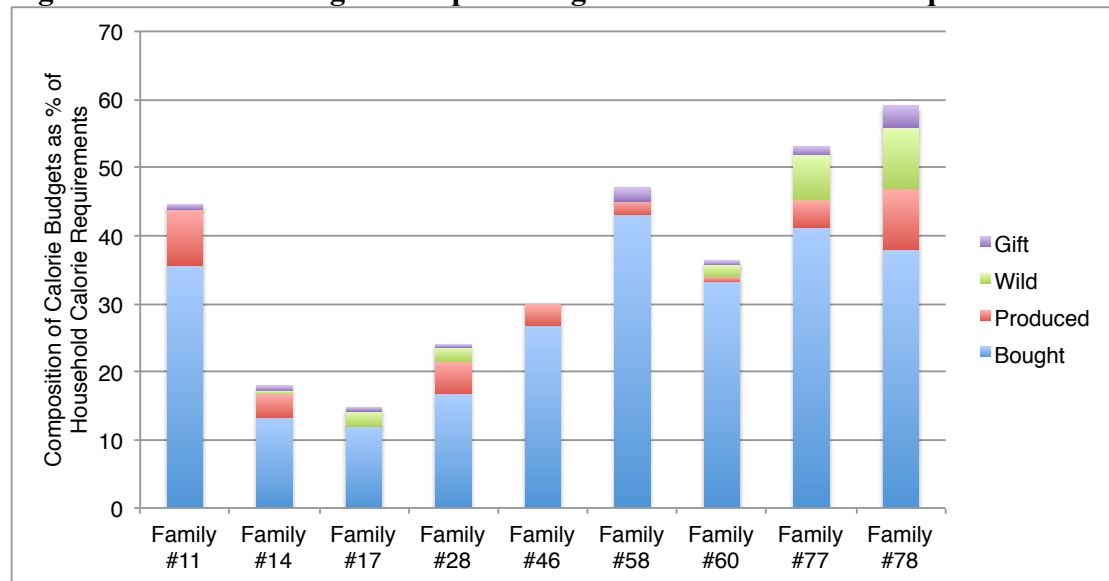
According to the dietary surveys, these families bought 79% of their total calories on average. This is about the same as what these families claimed when they responded to the household surveys (76%), but much higher than the average (65%) for all Rama Cay

residents based on the household surveys. It is therefore possible these families are not entirely representative of the Rama Cay population as a whole because they appear to rely more on bought foods than the average for Rama Cay. It could be that the sample used in this chapter to model the impacts of the weather is therefore not fully representative of all the Rama on Rama Cay.

This means that although this adaptation of the HEA framework is basing Stage 3 on more detailed data about the food the Rama eat than would have been collected in the original HEA framework, it may not have addressed the problem of its conclusions being based on a small sample size. In fact, it is likely to be a less representative sample because the families chosen are generally better off than the average Rama households and so would likely all fit into the highest wealth grouping (if just the Rama were sampled). The families selected to be included in the dietary recall data collection were chosen in order to be representative sample of the different wealth levels on Rama Cay. Only a few of these households participated, however, with some initially agreeing to participate and then not doing so. The sample discussed in this chapter is, therefore, less representative than was originally intended.

As with the household survey data, the daily calorie requirements of each household were calculated based on demographic information. For each family, it was therefore possible to determine whether or not their daily calorie consumption (as stated in the dietary surveys) was sufficient for their calorie requirements. This is shown in Figure 6.3 (below), which also includes the data displayed in Figure 6.2 on how each family's calorie budgets are sourced.

**Figure 6.3: Calorie budgets as a percentage of household calorie requirements**



Source: Author

As can be seen, the nine families selected for the dietary surveys were not eating sufficient calories for their requirements based on the demographic composition of their households and the food they said they had eaten. Even Family #78 – whose household members ate the highest amount of calories relative to their requirements – were still eating less than 60% of their calorie requirements. This is similar to the household survey data, which suggested most Rama families were not eating sufficient calories (see chapter four).

Although one or two of these families were struggling more than the others, qualitative observations did not suggest that any of these families were eating significantly less than their daily calorie requirements. It might be expected that if any of the families who participated in the dietary surveys were only eating as little of their calories daily calorie requirements as these data suggest (only 15% of their requirements in one case) the participants would have mentioned this in the interviews. It is more likely, therefore, that these results have resulted from problems with how the data were collected and/or how the measures were calculated. As explained in the methodology chapter (chapter three) and the first results chapter (chapter four), there is a large possibility of error in this calculation due to the calorie values ascribed to individual food items and the calorie requirements for individual household members (see part two of sub-section 3.6.1 of chapter six).

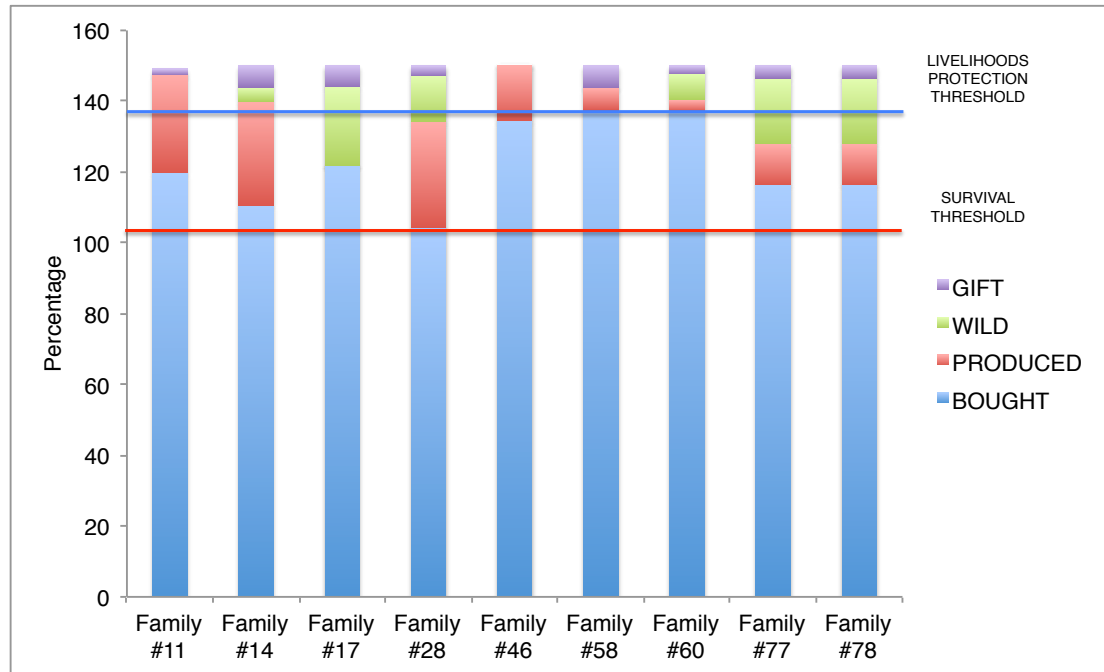
Because of these problems and because of the difficulty of making comparisons between the families with such large discrepancies between them, the data were adjusted so they could be modelled against the HEA thresholds. The following section explains how this was achieved.

### **6.3: Adjusting the data**

The data for the families who completed dietary surveys were adjusted so their baseline was higher than the Livelihoods Protection Threshold. This presumes the data collected (either the calorie requirements of the family or the amount each family was eating) was not accurate and that each family's average daily calorie intake was more than this threshold. This is problematic because it presumes that all the families surveyed were food secure and it does not taken into account daily fluctuations and other differences between the families. It does, however, allow each household to be modelled in accordance with the HEA and for direct comparisons to be made between the households.

The average total daily calories each family ate were used as the denominator and the numerators were taken to be the percentage contribution of each calorie source: Bought, Produced, Wild, Gift. These values were then modelled against a base of 150% so each family met the Livelihoods Threshold (approximately 140% of the household's daily calorie requirements) suggested by the HEA. Because these increases were percentage increases, all the values within the original data remained the same relative to each other. For example, if 80% of a family's food comes from bought sources and 18% comes from food they have produced (as with Family #11), this is still the case after the adjustment. This adjustment, which provided the baseline for the model, is shown in Figure 6.4 (below).

**Figure 6.4: Composition of calorie budgets (adjusted) against HEA thresholds**



Source: Author

This section of the chapter has explained how the dietary survey data were adjusted to allow them to be compared against the HEA thresholds and each other. The following section will explain how the scenarios and families to be modelled were chosen.

#### **6.4: Choosing the families and the scenarios**

Because of the amount of data available, it was appropriate to choose only a small number of families and weather scenarios to model (shown in Table 6.2 below). These scenarios were based on the real, past impacts of different weather conditions as described by the Rama and presented in chapter five (Table 5.1, pg. 192). They were chosen to include at least one drought and one flood and to cover impacts on both fishing and farming. This section of the chapter will describe how the families were chosen and matched to the three scenarios.

Table 6.2: Description of the scenarios to be modelled

Scenario	Scenario description	Outlined by respondent	Description of past events
1	A drought that causes a 90% reduction in the yield of cassava	#38 and #S35	In a good month = 10 sacks of cassava, in a month with a bad drought = 1 sack of cassava
2	A flood that causes a 50% reduction in the yield of beans	#6	When it is good, you might be able to harvest 6 sacks of beans, but when it rains a lot, you might lose 1-3 sacks, or perhaps all of it
		#S20	In a good year, they expect a crop of around 1000lb of beans, but could have less than 500lb in a bad year
3	A flood that causes a 90% reduction in the yield of fish	#20	When the river floods, 'rubbish' comes down into the lagoon and reduces the typical catch of fish from 100lb to 10lb

Source: Author

As shown in chapter four, most Rama families on Rama Cay rely on income from employment, selling fish or selling produce to be able to buy their food. Although the HEA method does include calculations of the impact of the weather on wages, this is largely beyond the scope of this thesis. For this reason, the scenarios modelled were based on the impact of the weather on fishing and farming. Four families were chosen based on how relevant their livelihood strategies were to these scenarios. As fishing is such an important source of food for all the families on Rama Cay, Scenario 3 was modelled for all four of the families. For the other two scenarios, the most appropriate two families were chosen, based on the crops they primarily cultivate.

Family #14 was excluded from the analysis because the family income came entirely from a salaried job. As mentioned above, calculations of the impact of the weather on employment is largely beyond the scope of this thesis. Families #11, #46 and #58 only provided data for a small number of days, which could potentially introduce a larger amount of uncertainty into the results. In addition, families #11 and #60 did not give income data during the dietary recall collection; the qualitative and quantitative data given in interviews and during the household surveys by these families was not sufficient to be able to establish how a particular scenario would affect their household budget through the sale of fish or farm produce.

Family #17 provided income data and 22 days of dietary data. Because this family grows cassava to sell, their baseline will be used model Scenario 1 – a drought that causes a 90% reduction in the yield of cassava – as well as Scenario 3.



Family #77 provided 24 days of dietary data, and although there is no income data, the qualitative data taken from observations and informal conversations was able to provide a good understanding of where they source their income. As this family is largely reliant on their bean crop, their baseline will be used to model Scenario 2 – a flood that causes a 50% reduction in the yield of beans – as well as Scenario 3.

Both Family #78 and Family #28 source 100% of their income from selling the fish they catch, according to the household surveys. Fish also contributed 100% of Family #28's wild food. These two families are therefore a useful comparison to model the impact of Scenario 3 – a flood that causes a 90% reduction in the yield of fish.

## **6.5: Results**

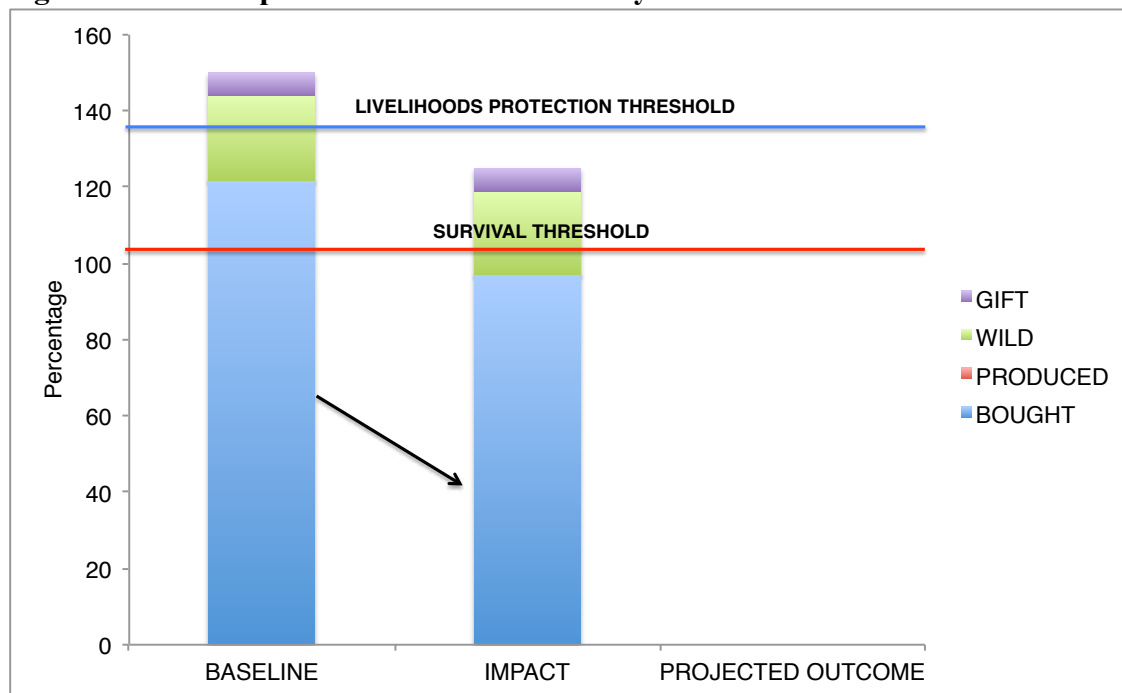
This section of the chapter will show how the three chosen scenarios could affect the calorie budgets of the four chosen families. The Figures shown will include Stages 1 (Baseline) and 3 (Impact) of the HEA calculation. Stage 4 of the calculation (Adaptation) for these and all the other Rama families will be discussed in chapter eight.

### *6.5.1: Scenario 1 (Family #17)*

Family #17's income comes from selling chicken, fish and cassava. Scenario 1 would only affect the cassava proportion of their bought calorie contribution to their calorie budget. Based on the household survey data, 23% of their income comes from selling cassava, so in the modelled scenario, this proportion of their income should drop by 90%. This would result in a 21% drop in the amount of food they can afford to buy, so a reduction of the bought food value from 122 to 97 was modelled. During the data collection for the period for the dietary survey, Family #17 said they did not eat any food they produced themselves, so only the change in income will be modelled. As seen in Figure 6.5 (below), the model suggests that the weather impact described in Scenario 1 would cause Family #17 to fall under the Livelihoods Protection Threshold, but they would still be able to meet their basic needs as defined by the Survival Threshold. If Scenario 1 were to occur, therefore, Family #17 would have to make use of all available

low- and medium-cost coping strategies and ensure staple food was prioritised over other purchases (Abu Libda *et al.*, 2013). Abu Libda and colleagues (2013: 56) state it is “very probable” that families in this situation would go hungry unless they also “resort to other undesirable high-cost coping strategies”.

**Figure 6.5: The impact of Scenario 1 on Family #17**

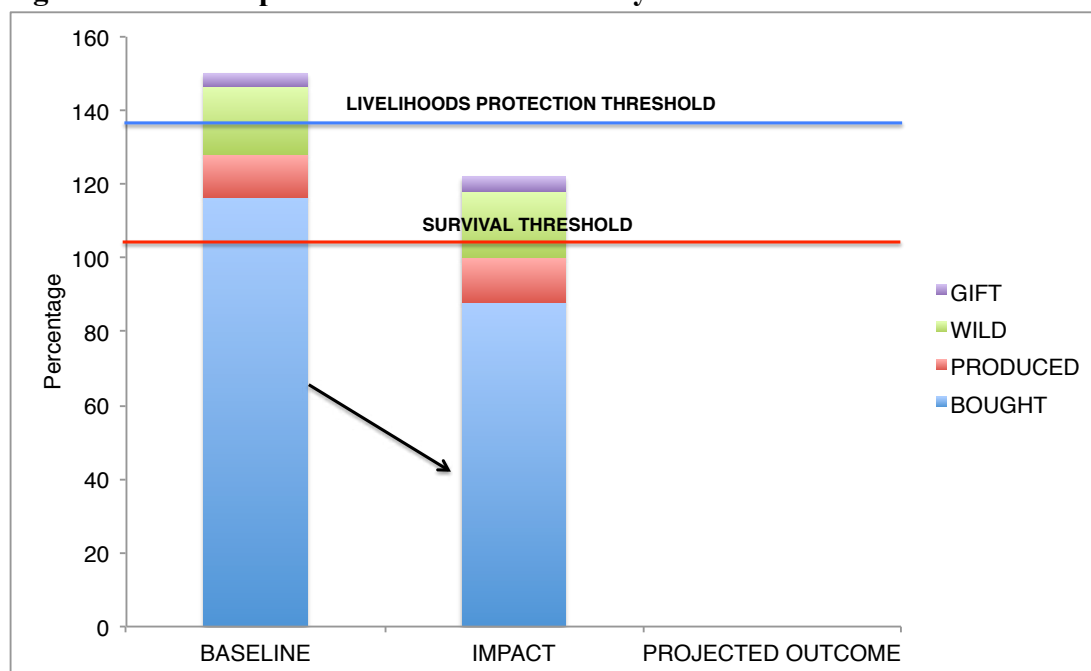


Source: Author

### 6.5.2: Scenario 2 (Family #77)

Family #77 would see their income from beans drop by 50% in Scenario 2, but their income from wild food – in this case fishing – would stay constant. There is no data about the relative contribution of beans and fish to their income. It was presumed for the purposes of this analysis that they contribute equally to household income and so a 25% reduction in the amount of bought food contributing towards their calorie budget was modelled (a reduction from 117 to 88). As seen in Figure 6.6 (below), the model suggests that the weather impact described in Scenario 2 would cause Family #77 to fall under both the Livelihoods Protection Threshold and the Survival Threshold described by the HEA. Based on these data, therefore, it is very probable that if Scenario 2 were to occur, Family #77 would “go hungry, unless they [were able to] resort to other undesirable high-cost coping strategies” (Abu Libda *et al.*, 2013: 56).

**Figure 6.6: The impact of Scenario 2 on Family #77**



Source: Author

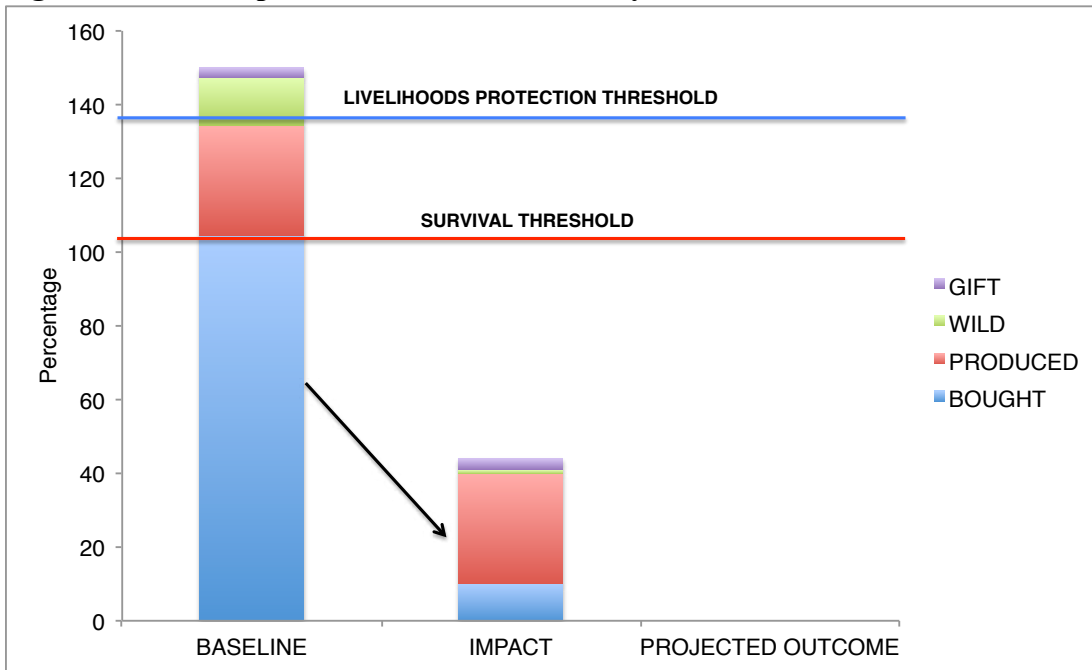
### 6.5.3: Scenario 3 (All families)

As mentioned, this scenario was modelled onto the calorie budgets of all four families that were selected.

#### 6.5.3.1: Scenario 3 (Family #28)

For Family #28, Scenario 3 – a flood that causes a 90% reduction in the yield of fish – would cause both their income and their wild food to reduce by 90%. This would reduce the bought and wild elements of their calorie budget by 90% (from 104 to 10 for the bought element and from 13 to 1 for the wild element). As seen in Figure 6.7 (below), the model suggests that the weather impact described in Scenario 3 would cause Family #28 to fall significantly below both the Livelihoods Protection Threshold and the Survival Threshold. Based on these data, therefore, it is very probable therefore that if scenario 3 were to occur, Family #28 would “go hungry, unless they [were able to] resort to other undesirable high-cost coping strategies” (Abu Libda *et al.*, 2013: 56).

**Figure 6.7: The impact of Scenario 3 on Family #28**



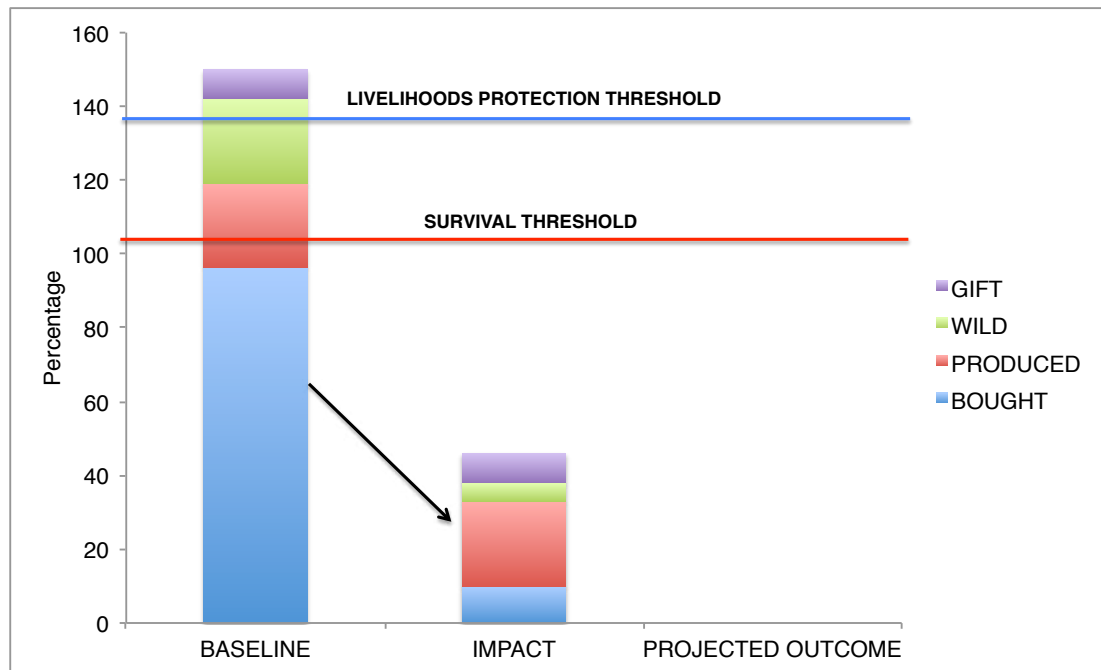
Source: Author

*6.5.3.2: Scenario 3 (Family #78)*

For Family #78, Scenario 3 would cause the bought element of their calorie budget to fall by 90% – from 96 to 10. The wild food element of their calorie budget would be more protected than Family #28’s, however, as they rely on a more diverse range of wild foods, such as foraging for oysters and hunting. Although Respondent #20 – who contributed the data for Scenario 3 – said oysters and cockles are affected by rubbish overflowing into the Bluefields Lagoon when there is a flood, he did not give a quantitative impact of this. This coupled to the lack of data for the impact of flooding on hunting yields means the impact of Scenario 3 on these other wild foods cannot be stated for Family #78 so only the fish element of their wild food can be modelled. Based on the dietary survey data, fish made up 89% of Family #78’s wild food budget, with the remaining 10% coming from oysters and iguana. If the fish proportion of their wild calorie budget was reduced by 90%, Family #78 would lose 80% ( $0.9 \times 89=80$ ) of the contribution to their wild food consumption. In Scenario 3, therefore, Family #78’s income – and by extension the bought element to their calorie budget – would drop by 90% (from 96 to 10) and the wild food contribution to their calorie budget would drop by 80% (from 23 to 5). As seen in Figure 6.8 (below), the model suggests that the weather impact described in Scenario 3 would cause Family #78 to fall significantly

below both the Livelihoods Protection Threshold and the Survival Threshold. Based on these data, therefore, it is very probable that if scenario 3 were to occur, Family #78 would “go hungry, unless they [were able to] resort to other undesirable high-cost coping strategies” (Abu Libda *et al.*, 2013: 56).

**Figure 6.8: The impact of Scenario 3 on Family #78**

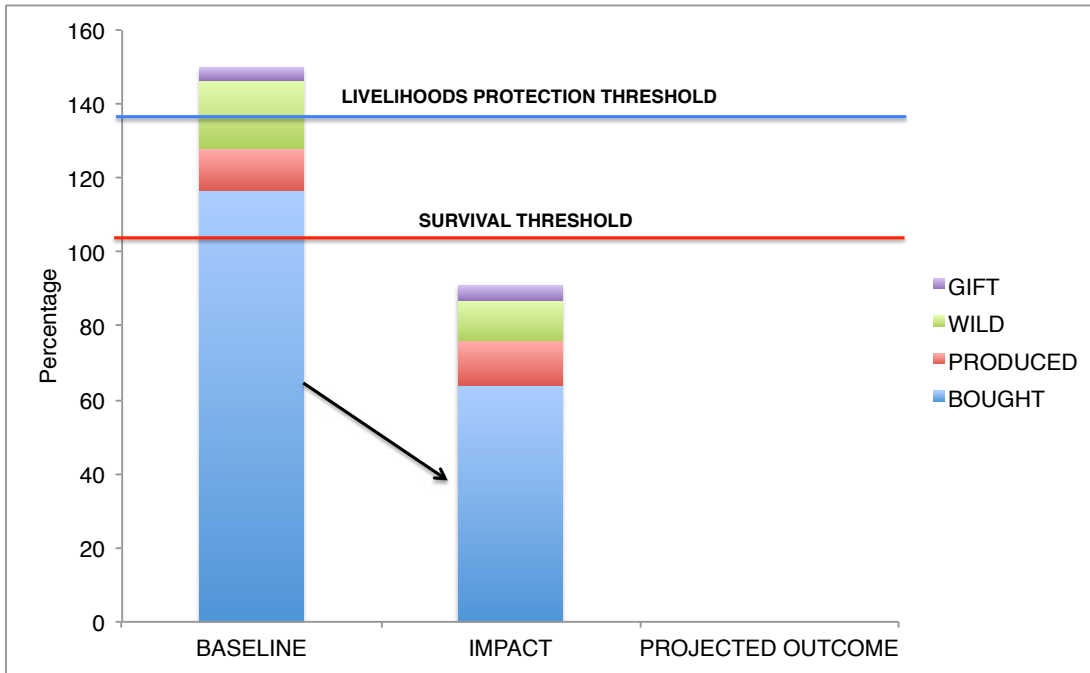


Source: Author

### 6.5.3.3: Scenario 3 (Family #77)

For Family #77, Scenario 3 would cause the bought element of their calorie budget to fall by 45% – from 117 to 64 – because fish makes up 50% of the bought element of their food ( $0.9 \times 50=45$ ). The wild food element of their calorie budget would be reduced by 41% – from 18 to 11 – because fish accounts for 45% of their wild sourced food ( $0.9 \times 45=41$ ). As seen in Figure 6.9 (below), the model suggests that the weather impact described in Scenario 3 would cause Family #77 to fall below both the Livelihoods Protection Threshold and the Survival Threshold. Based on these data, therefore, it is very probable therefore that if scenario 3 were to occur, Family #78 would “go hungry, unless they [were able to] resort to other undesirable high-cost coping strategies” (Abu Libda *et al.*, 2013: 56).

**Figure 6.9: The impact of Scenario 3 on Family #77**

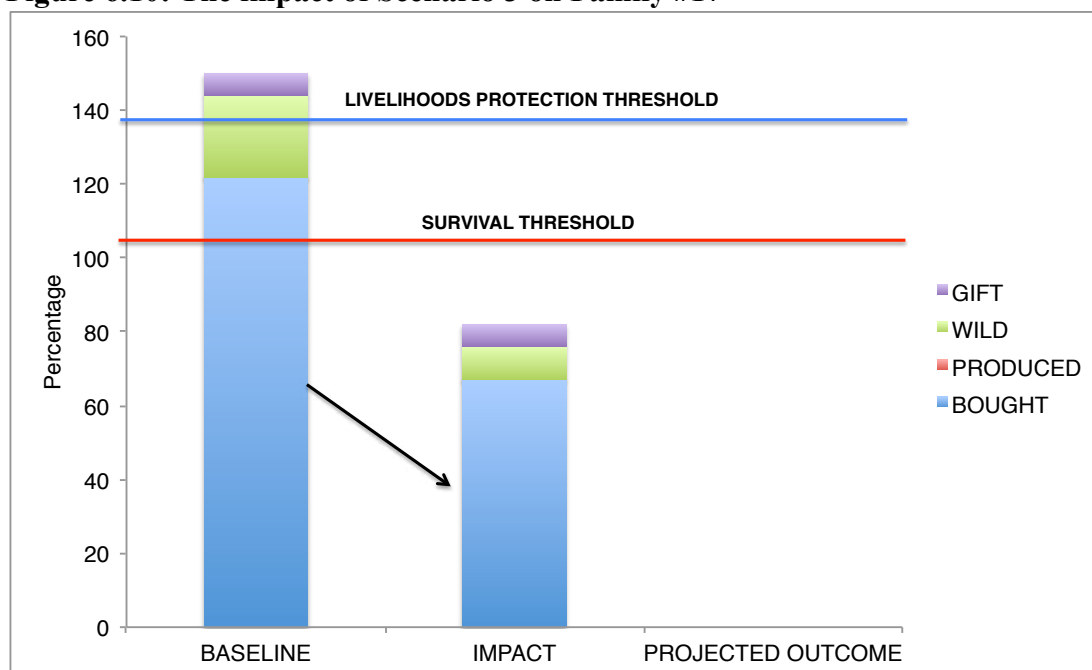


Source: Author

*6.5.3.4: Scenario 3 (Family #17)*

For Family #17, Scenario 3 would cause the bought element of their calorie budget to fall by 45% (from 122 to 67) because fish accounts for half of the income they use to buy food ( $0.9 \times 50=45$ ). The wild food element of their calorie budget would be reduced by 60% (from 22 to 9) because fish accounts for 67% of the bought element of their food ( $0.9 \times 67=60.3$ ). As seen in Figure 6.10 (below), the model suggests that the weather impact described in Scenario 3 would cause Family #77 to fall below both the Livelihoods Protection Threshold and the Survival Threshold. Based on these data, therefore, it is very probable therefore that if Scenario 3 were to occur, Family #78 would “go hungry, unless they [were able to] resort to other undesirable high-cost coping strategies” (Abu Libda *et al.*, 2013: 56).

**Figure 6.10: The impact of Scenario 3 on Family #17**



Source: Author

#### 6.5.4: Summary

The data presented here suggest that most families would struggle to meet their required calorie budgets when faced with the scenarios they were matched to. It has also shown that there is a large difference in the extent of their vulnerabilities to the same event (Scenario 3). Despite this, these families would likely be placed in the same wealth group – the chief differentiator between families – by the original HEA framework. This reiterates the point that the original HEA’s focus on livelihood zones that cover a large geographical area may obscure heterogeneity within communities. It is essential to have data at the household level to ensure effective policies that help the most vulnerable can be designed.

#### 6.6: Limitations

There are limitations to the findings presented in this chapter. Although the results suggest that the weather scenarios modelled could cause dramatic outcomes for these families, it is likely that the reality of how these threats impact the Rama’s food would be very different. Firstly, the scenarios were only modelled on to the dietary recall data

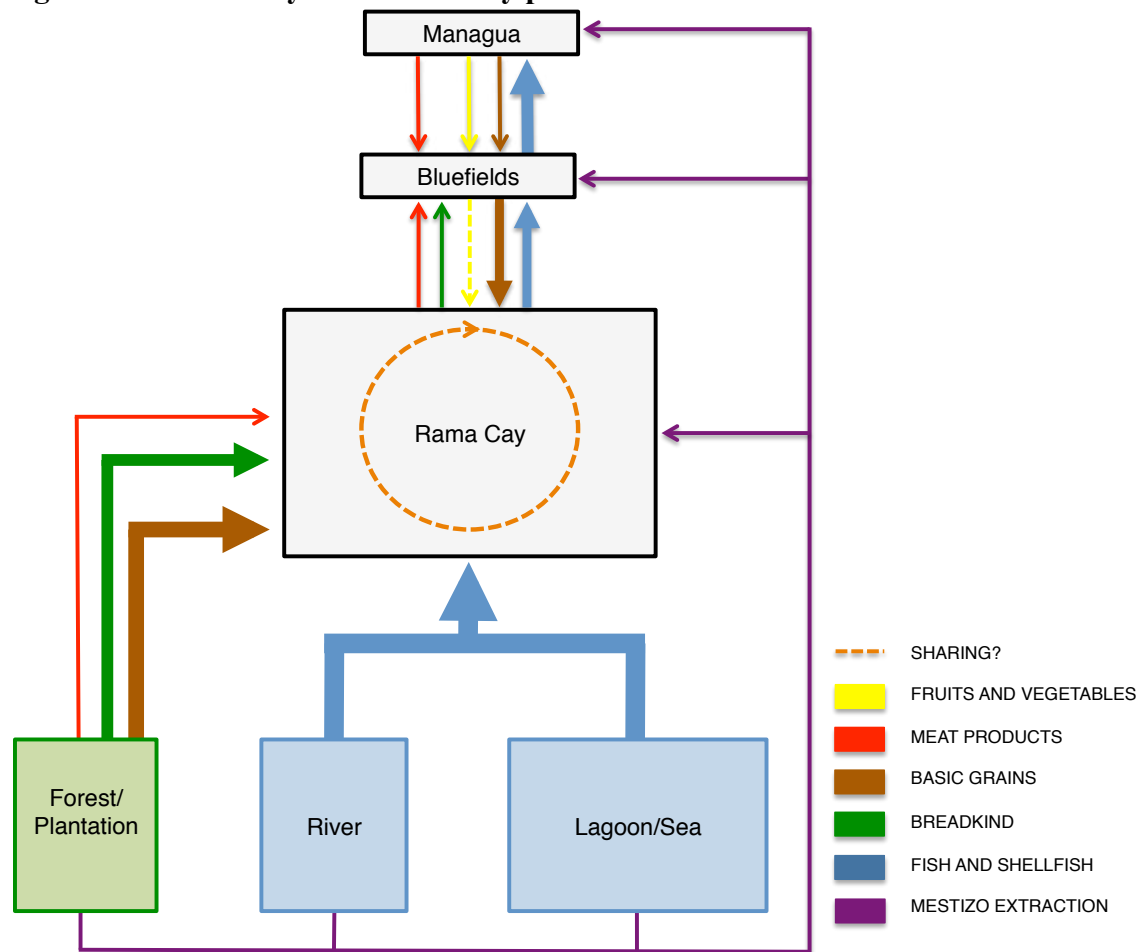
of four families. This means that these data cannot be assumed to be representative of the experience of all Rama households.

Secondly, these models do not take into account the way these scenarios are likely to affect the families on the ground. Not only was just one threat modelled in each basic calculation, but also these data are based on the presumptions that the households will both not respond to these threats, and/or have not undertaken proactive actions prior to the threat occurring. It is likely that these families would respond in different ways to the same threat. In this context, even if a family chose not to do anything in response to a scenario such as the three modeled here, the absence of a response would need to be considered as an important differentiator between the family's vulnerability and the vulnerability of other Rama families.

The following two figures (Figure 6.11 and 6.12, below) will help to demonstrate how the scenarios modeled in this chapter could interact with the responses of the Rama. Figure 6.11 outlines the foodways of the Rama on Rama Cay and Figure 6.12 shows how the scenarios presented in this chapter might affect this system. Chapter eight will outline how the Rama have responded to threats to their food security in the past, and a further figure (Figure 8.3) will illustrate how the Rama might respond to the altered foodways depicted in Figure 6.12.



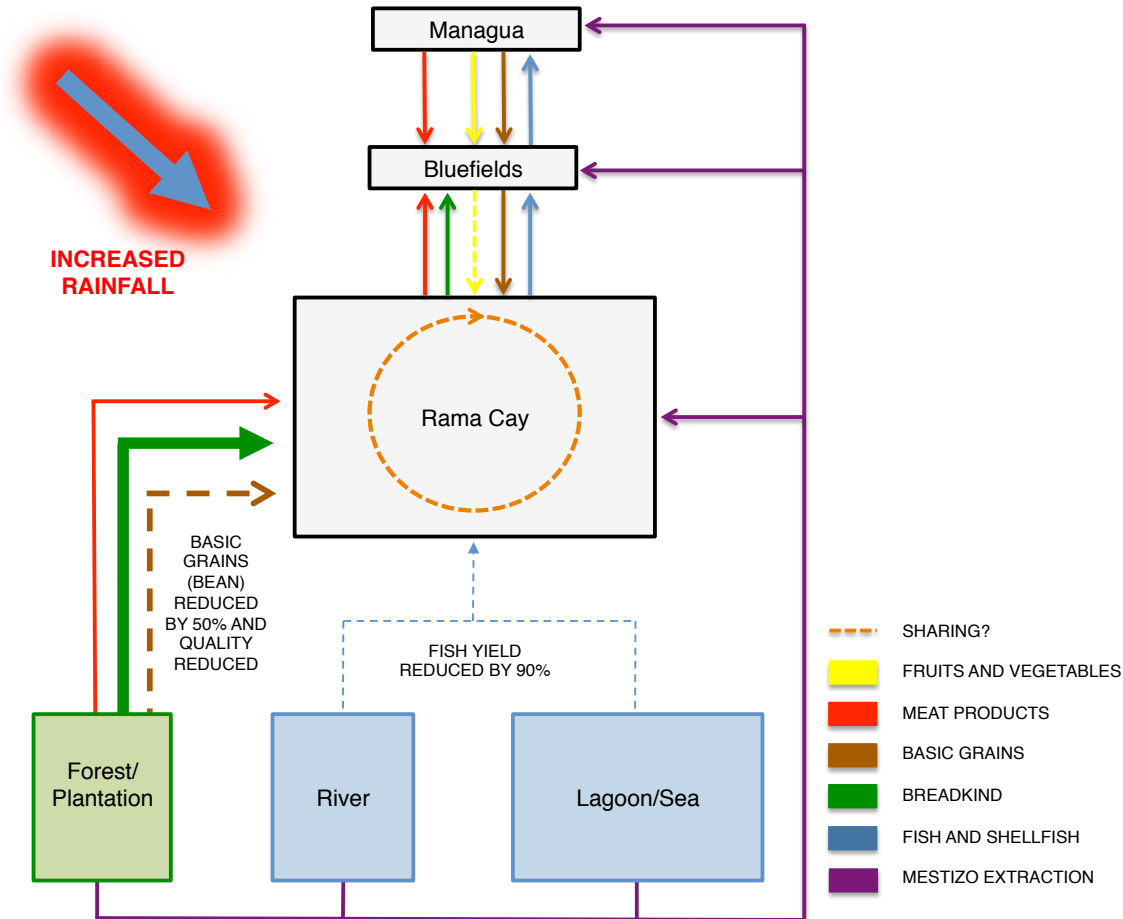
**Figure 6.11: Foodways for Rama Cay prior to scenarios modelled**



Source: Author

Figure 6.11 (above) is based on Figure 4.17 (chapter four) and shows a generalised flow of food products to and from the community of Rama Cay. It depicts the way the Rama in this community source their food and the relative contribution of each type of food. For example, the Rama on Rama Cay rely more on seafood from the Kukra River, Bluefields Lagoon and the sea than they do on food from the forest and their plantations. Equally, it shows that the Rama on Rama Cay sell more seafood to Bluefields than they sell forest/plantation products. The Mestizo extraction of resources is shown in purple.

**Figure 6.12: Impact of modelled scenarios on the foodways of Rama Cay**



Source: Author

Figure 6.12 (above) shows how an increase in rainfall could affect the foodways of the Rama on Rama Cay as shown in Figure 6.11 (above). The possible reductions or interruptions in the flow of different food types are shown by the altered relative contribution of each type of food. For example, increased rainfall could cause Scenario 3, which was a flood that reduced the fish yield by 90%. This has been depicted as a significant decrease in the width of blue arrows from the River and the Lagoon/Sea to Rama Cay. The line is dashed to show how differences in rainfall can also mean that some Rama who do not own a gill net or boat motor are less able to catch fish (as outlined in chapter seven).

The way in which the Rama on Rama Cay would respond to the foodways scenario presented in Figure 6.12 (above) will be depicted in Figure 8.3 after the generalised responses of the Rama are outlined in chapter eight.

## 6.7: Chapter summary

This chapter has modelled the impact of three weather scenarios identified by the Rama (and outlined in chapter five) onto the baseline calorie budgets of four Rama families taken from the dietary surveys. It is one of the two chapters that represent the Impact stage of the HEA.

It started by presenting the summary statistics for the families who participated in the dietary surveys and comparing this information to the household survey findings. It then showed that all of the nine families who did the dietary surveys were not eating sufficient calories for their requirements based on the demographic composition of their households and the food they said they had eaten. For this reason, the data were adjusted before being modelled to ensure they could be directly compared during the HEA process and to each other. This was justified because (as shown in chapter four) these data may not be accurate.

The results of the modelling showed that for all of the families, at least one of the scenarios modelled would drop their calorie budgets underneath the Survival Threshold determined by the HEA, which means these families would go hungry unless they also used “other undesirable high-cost coping strategies” (Abdu Libda et al. 2013: 56). For Family #17, Scenario 2 would drop their calorie budget underneath the Livelihoods Protection Threshold, but not the Survival Threshold. This means they would still be able to meet their basic needs but they would have to make use of all available low- and medium-cost coping strategies and ensure staple food was prioritised over other purchases (Abu Libda *et al.*, 2013).

Scenario 3 was modelled for all of the families and it showed that all four would have a different level of vulnerability to this same event. This is despite the fact that these families would likely be placed in the same wealth grouping by the original HEA framework. This suggests that due to its focus on livelihood zones that cover large geographical areas the original HEA framework could miss important differences within communities that were highlighted by the fine-grained nature of the dietary recall data used by the adaptation of the method used by this thesis.

The chapter has also highlighted one of the limitations of the original HEA framework: it is not able to reveal how the specified threats interact with other unspecified threats. For example, it is likely that a drought that causes a significant drop in cassava yields would also cause a significant drop in the yields of other crops and food prices, but the impact of biodiversity loss, shift in diets and the Mestizo encroachment into the Rama territory (for example), would also have an influence on each household's exposure (and the responses that were available to them). The original HEA framework does not consider in-depth qualitative information on culture and other important differentiators within communities (other than wealth), so it is less able to consider differences related to the access and utilisation dimensions of food security, as the model is focused on the availability dimension.

Of course, the data used also ignore the way in which these scenarios would actually affect these families on the ground. This is because the adaptation of the families is not considered in these graphs. These families would respond in different ways to the same threat, and would probably respond differently even to the same level of calorie budget deficit. In this context, even if a family chose not to do anything in response to a scenario such as the three modelled here, the absence of a response would need to be considered as an important differentiator between the family's vulnerability and the vulnerability of other Rama families.

Section 6.6 of this chapter begins to address this final limitation of the modelling used in this chapter. It presented two figures (Figure 6.11 and 6.12), which depict the foodways of the Rama who live on Rama Cay both before and after a climate shock of increased rainfall. These will be compared to Figure 8.3 in chapter eight to demonstrate how the scenarios modeled in this chapter could interact with the Rama's responses to similar climate shocks.

## 7. The Rama's perception of the weather

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This chapter will show how certain weather conditions differentially impact the Rama's ability to catch fish. It was decided to focus on fishing activities because of the importance of fishing to both the Rama's foodways and their culture. The chapter represents the second chapter on Stage 3 (Impact) of the Household Economy Analysis (HEA) framework used by this thesis. Whereas chapter six outlined the potential impacts of the threats identified by the Rama on their food security in quantitative terms, this chapter will show how the key threat (weather) can impact on the Rama in different ways and thereby highlight the heterogeneity that exists within the community.

This chapter shows that potential winners and losers (with respect to food security) resulting from threats are partly determined by the political ecology of the Rama communities. This is something that cannot be understood through the original HEA framework. This chapter relies on evidence drawn from the in-depth interviews that were not part of the original HEA framework. Although the original HEA framework is able to quantify the impacts of weather threats, it cannot capture the more nuanced effects of the weather on a community's food security, such as those outlined here.

The chapter argues that the fishing equipment owned by Rama families changes their perception about what they consider to be 'bad' weather. It focuses on the way in which weather conditions affect the Rama's fishing, which is defined as the catching of fish and prawns, and the sourcing of other seafood such as cockles and oysters. Some Rama individuals purchase fishing equipment (motor boats and gill nets) that can be used in windy conditions when fish tend to be easier to catch. As a result, they see windy weather as being 'good'. In contrast, those Rama who fish using the traditional methods of hand nets and a sail- or paddle-powered dory<sup>1</sup> are much less able to fish effectively in windy weather. As a result, they view windy weather as being 'bad' weather. The chapter argues that weather conditions might contribute to the poverty cycle in which some Rama households find themselves. An important implication of this is that climate change will likely increase the variance in vulnerability and adaptive capacity between Rama families because of how certain weather conditions affect families differently.

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<sup>1</sup> As mentioned in chapter four, dories are small, traditional, hand-carved wooden boats

Equally, policymakers need to be aware of the different ways people talk about and experience the impacts of the weather on their livelihoods.

The chapter is structured into four sections. The first section will outline what types of weather the respondents said makes it difficult to fish and show there is a polarised opinion about this within the community. The second section will explain that these differences are due to the different fishing equipment that are owned by families – namely motorboats and gill nets. It will explain how this equipment – ‘endowments’ in the parlance of the entitlements approach to food security – makes it easier for those who own it to fish in windy weather conditions. It will also discuss the wealth and livelihood strategies of these households to explain the reason why they have access to these endowments. The third section will explain how and why the differences outlined in the first two sections of this chapter combine with socio-economic factors to reinforce the existing inequality within Rama society.

### **7.1: A difference of opinion**

As discussed in chapter five, respondents stated the weather was the most common threat to their food. This first section of the chapter will show that the Rama have different opinions about which weather affects their fishing activities.

All respondents were asked when it was hard for them to source enough fish for their families and themselves. Most of them talked about either a particular type of weather, such as “when calm time” (Respondent #30) or “when time is rough” (Respondent #21), or a specific month or months. For those participants that mentioned specific months rather than weather conditions, they were asked what it was that made those months the most difficult for sourcing their food. These participants would invariably refer to the usual weather conditions in those months.

Table 7.1 (below) contains a simple tally of which respondents found which weather conditions difficult to fish in. As the table indicates, the most common response from the Rama interviewed was that it is most difficult to fish in windy weather. The table should not be treated as a quantitative frequency table, as some of the assertions are more significant in their own context or put stronger than others.

Table 7.1: Weather conditions in which it is difficult for the Rama to fish

Difficulty when:	Respondents
Windy	#3; #6; #9; #11; #14; #18; #21; #25; #26; #34; #S48
Raining	#6; #28
Dry Season	#8; #20; #S59; #S70
Calm	#8; #30
High tide	#4; #10

Source: Author

In the case of respondents stating that windy and/or rainy weather makes it difficult to fish, however, this tended to be a strong assertion. This is demonstrated by the quotes from two of the listed respondents given below:

“[H]ere in the fishing and food in the lagoon [...] well we can’t go for look it when the [...] breeze harder.”

*Respondent #6*

“The blowing of the north wind [is when it is hard to fish]. Yeah we can’t go out when the weather too rough... the dory [is] too small.”

*Respondent #14*

In contrast, two respondents (#8 and #30) said they found it more difficult to fish when the weather was calm (as shown in Table 7.1). In fact, these respondents held completely the opposite view to the 13 respondents who cited windy weather as being the most difficult weather to fish in. This can be seen in Table 7.2 (below), which shows the type of weather respondents considered to be the *easiest* in which to catch fish. In response to this question, Respondents #8 and #30 (as well as Respondent #31) stated they found windy weather easy or easier to fish in.

Table 7.2: Weather conditions in which it is easy/easier for the Rama to fish

Easy/easier when:	Respondents
Windy	#8; #30; #31
Rain	#8; #20; #30; #31; #38; #S40
Dry Season	#S12
Calm	#3; #6; #26
Low Tide	#4

Source: Author

Again this table should not be treated as a simple, quantitative frequency table, but in the case of respondents #8, #30 and #31, this was a strongly put opinion as established in the following quotes:

“The fish weather is plenty breeze. Them the time that fish is plenty. Then it’s almost fishing is good, running good we say, and the fisherman catch a lot.”

*Respondent #8*

“Well we have [more fish] from this month [at the end of May]. Whole time we have fish. Like this rough time we have fish plenty, the people find that.”

*Respondent #30*

Correspondingly, when those respondents who named the windy time as being difficult conditions in which to fish were asked to name the best time for fishing, a number gave the calm (less windy) months as being easier for fishing. Respondent #3, for example, said the best time was when “[it] get calm again; calm you would say. So in them times it’s difficult for everybody.” This shows there is a clear divide between respondents. Some respondents find calm conditions to be best for fishing and find windy conditions more difficult, whereas other respondents find windy conditions to be best for fishing and find calm conditions more difficult.

The following section of this chapter will show that these differences are because these two groups of people own different fishing equipment.

## **7.2: Fishing equipment – boat motors and gill nets**

This section will argue that Respondents #8, #30 and #31 have a different opinion about weather conditions to the other respondents because they own boat motors and gill nets. This means they are able to fish in conditions that other Rama fishermen cannot. This section will explain how and why access to boat motors and gill nets is important when it comes to the perception of what weather is best for catching fish.



### 7.2.1 Boat motors

For most respondents who said the windy weather made fishing difficult, the reason they gave was because they had to paddle or sail their dories against the wind and through rough conditions to fishing grounds and the oyster and cockle banks.

“[H]ere in the fishing [...] in the lagoon [...] well we can’t go for look it when the weather hard [...] and sometime when we can’t get through to the oyster paddling maybe because the breeze harder.”

*Respondent #6*

This was also given as the reason by Respondent #3 for why he found calmer weather to be better for fishing.

“[W]e just use dory and paddle you know and [this] does not work until the breeze [...] get calm again.”

*Respondent #3*

Respondents #8, #30 and #31 all own boat motors and use these to fish. As can be seen in the following quotes – one by a respondent who owns a boat motor and the other by a respondent who does not – this means they are able to go out in windy conditions because they do not have to sail or row against the wind.

“When it rain hard, the fish run better and so well, I have motor, so I can go out in stiff breeze, not like some.”

*Respondent #31 (Owns a boat motor)*

“[W]hen we see the breeze is from the north is very hard, it’s strong. So in them times it’s difficult to row and maybe get shrimps and those things because [...] some of us maybe not have motor [or other] things to go against the breeze.”

*Respondent #3 (Does not own a boat motor)*

The three respondents who own boat motors also own pangas – larger boats made out of fibreglass. These are also advantageous during windy conditions as they are more able to cope with larger waves than dories as shown by the quote below:

“Yeah we can’t go out when the weather too rough [...] The dory too small so we catching with line them.”

*Respondent #14*

Evidently then, these three respondents are likely to find it easier to fish in windy conditions than other Rama fishermen because their pangas and boat motors are more able to cope with these conditions. It could be argued, therefore, that the differences in perception of the best weather in which to catch fish are due to whether or not respondents own these items. The evidence suggests that if you have a boat motor (and perhaps also a panga), you view the windy weather as being advantageous for fishing, or ‘good’, whereas if you don’t own one, you view the windy weather as difficult for fishing in, or ‘bad’. Respondent #8 said the reason was that in these conditions the fish “running good”, meaning there appears to be more, but it could also be because there is less competition for the same fish during these weather conditions. This supports Nolin’s (2010) research conducted with Lamaleran fishermen in Indonesia that showed there can be large variances in the use, and the success of fishing as a result of using motor- and non motor-powered boats.

Based on this argument, it might be assumed that all families that rely predominantly on fishing and who own a boat motor either view windy weather as advantageous, or do not see it as a threat to their food. This is not the case, however, as three respondents (#4, #20 and #26) who own boat motors named other weather conditions. As can be seen in Tables 7.1 and 7.2, Respondent #4 spoke about the impact of high and low tides and Respondent #20 spoke about the difference between the dry and wet seasons. It cannot be argued that these two respondents’ assertions support the premise that the differences in opinion between the two groups of respondents (identified in Section 7.1) are due to the possession of boat motors, but they certainly do not undermine it.

Respondent #26 stated in the survey that her family owned a boat motor, but named windy weather as bad weather when asked in the interview. This respondent therefore directly challenges the theory that if you have a boat motor, you view the windy weather as being advantageous for fishing. There are, however, reasons to treat this respondent’s assertions with caution.

Firstly, it is possible that she does not have access to a boat motor. As mentioned in chapter three, the sampling methodology for the surveys could have resulted in boat motors being incorrectly allocated to respondents because of how households were determined (based on the concept of “kitchens”). Whereas the other three respondents spoke explicitly about their own motor in the in-depth interviews, the evidence I have for this respondent is that she is recorded as having one by the household survey data. When respondents were asked if they had a boat motor, they could have said they did if either they personally owned one or if they had access to one through their nuclear or extended family. In the case of Respondent #26, her son is Respondent #8 who, as established, owns a boat motor. Respondent #26 could have been referring to the boat motor owned by her son when she was asked when surveyed. If this were the case, this motor would have been counted twice in the surveys and Respondent #26 has been classified as owning a boat motor even though she does not own or regularly use it.

Despite this, it may be expected that even if Respondent #26 does not actually have direct access to a boat motor, nor fish herself, Respondent #8 might share and discuss his opinions with her and influence her responses to the interview. The interview did reveal, however, that there is some disagreement within the family. I did not delve deeper into this during the interview, so cannot be more precise, but Respondent #26 said that she ‘has a little problem’ with her sons and does not speak to them regularly. It’s possible that any information she knows about present fishing conditions could have come from neighbours or friends who do not own boat motors rather than her son who has one.

Secondly, although it is unclear from the interview whether or not Respondent #26 was ever extensively involved in fishing – as she states that she has lived on the mainland as a farmer for most of her life – it is evident that she does not fish now. Her main activity within the family is food purchasing and preparation rather than food sourcing. Because she is not presently engaged with fishing, her knowledge about what weather is good for catching fish may not be contemporaneous.

Finally, in windy weather it is likely that there is less fish being caught by the Rama as a whole and therefore less fish sold on the island by the Rama. As previously stated, Respondent #26 is responsible for food purchases within her family. She may therefore be more aware of fluctuations in the availability and price of fish being sold on Rama

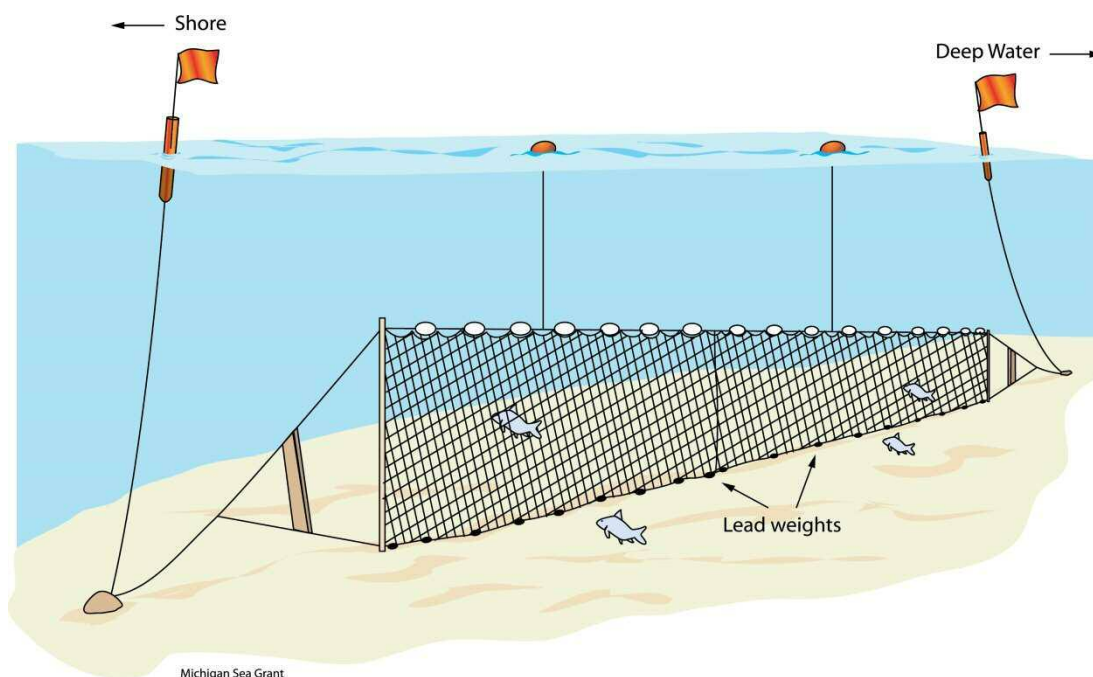
Cay as a result of the weather than she is of its impact on the availability of fish in the lagoon and her son's ability to catch it.

In summation, there are a number of reasons why Respondent #26 might contradict the views of other Rama who own a boat motor. It is not clear whether or not Respondent #26 actually owns a boat motor, whereas the other respondents explicitly spoke about their own boat motor. Even if she does have access to a boat motor, she herself does not fish so her knowledge about what weather affects fishing may not be contemporaneous. Instead her knowledge may instead come from conversations with her neighbours and friends who do not have boat motors, or her understanding of how the fish market on Rama Cay changes in windy weather. It is fair to argue then that there is reasonable doubt about whether Respondent #26's assertions contradict the hypothesis that the difference in opinion about whether windy weather is better for catching fish is due to boat motor ownership.

#### *7.2.2: Gill nets*

The previous sub-section showed that the difference in perception about windy weather is in part due to whether or not the respondent possesses a boat motor. This section will argue that the possession of gill nets may also contribute to the differences in opinion between these two groups. As noted previously in chapter four, the Rama have traditionally caught fish using a hook and line, or a small hand net cast from their dories. In recent years, perhaps due to the increased number of Mestizos arriving into the autonomous regions of the Caribbean Coast, Rama fishermen have also used gill nets. As explained in chapter four, gill nets are larger than the traditional Rama hand-nets and they are set in the water as shown in Figure 7.1 (below). The gill nets allow the fish to swim into the mesh of the net, but the fish's gill covers then prevent them from being able to reverse out again.

**Figure 7.1: A diagram to show how gill nets are set to catch fish**



Source: Safina Center (2017)

The interviews revealed that five of the six families that owned boat motors also owned a gill net, with Respondent #26 being the head of the family that doesn't. Based on the findings outlined in the previous sub-section, the evidence suggests this may be because she does not actually own a boat motor or fish regularly.

A number of respondents – regardless of whether they owned a gill net or not – said that it was easier to catch fish with a gill net in windy weather:

“[Y]ou see December time plenty wind [...] everything is hard in December. [But for] those who have gill net, sure it not hard because they have just set the net in the night and next morning they go and take up them fish.”

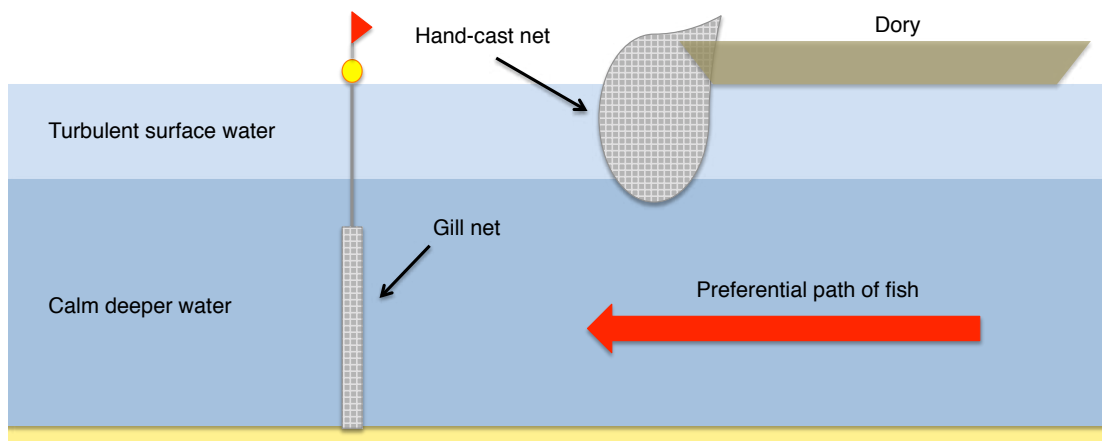
*Respondent #18*

Respondent #27 said that he found the “breezy time” very difficult to fish in, but because his son has a gill net, he is able to “survive” on the gifts of food he receives from him until the weather is better.

This may be because gill nets are more able to catch fish that are swimming along the bottom of the lagoon, rivers or sea when conditions are windy. It might be expected that

during windy weather, the water near the surface of the sea or lagoon is churned up by the wind more than the water at the bottom. It was observed that on windy days during the data collection period the lagoon and the sea surface was very choppy. As a result, the fish may prefer to swim along the bottom of the channel rather than the top of the channel. This is shown in Figure 7.2 (below)

**Figure 7.2: The effect of the wind on catching fish with different nets**



Source: Author

The traditional hand-cast nets used by the majority of the Rama are unlikely to be able to reach much further down into the sea, lagoon or rivers than the surface water that would be churned up by windy weather. In contrast, the gill nets are designed to sit in the calmer waters towards the bottom of these fishing grounds. It may be, therefore, that during windy weather, traditional Rama fishing nets are ineffective at reaching the areas in the Rama fishing grounds where the fish are swimming. In contrast, gill nets are designed to be able to catch fish regardless of the weather conditions on the surface. This means that the Rama are more likely to think windy weather is good weather if they own a gill net.

Respondent #18 believes the reason why catching fish is difficult when it is windy was because the fish themselves do not like these conditions. He said: “You know the fish not like the wind. Them always like the time to be calm” (Respondent #18). Respondent (#38) said it may be easier to catch fish in windy weather with a gill net because the windy weather tends to bring rain and the fish “run a lot” because they like the rain.

As previously stated by Respondent #14, if it is too windy to go out in a dory to catch fish, most Rama are forced to use a hook line to catch fish instead. Not only will they catch fewer fish, but also those they do catch will be of a lower quality.

“[T]hey say that if you put your gill net you catch all types, but when you go fishing with your line you not catch [...] all of these kinds of quality.”

*Respondent #4*

This assertion is supported by Respondent #9 who said that “you have to set gill net” to be able to catch the more expensive fish. Respondent #9 also suggested that having a gill net is an advantage in all weather conditions, increasing both yield and the quality of fish caught. Being forced to fish only with a hook line therefore reduces potential long-term income.

The evidence therefore suggests that having a gill net could be a reason why some Rama view the windy weather as being advantageous, or ‘good’, whereas if you don’t own one, you view the windy weather as difficult, or ‘bad’. It is possible that this difference could be because the fish prefer this weather, or due to the fact that those Rama who own a gill net are more able to catch fish underneath the water that is churned up when conditions are windy and too difficult for the fish to swim through.

This section of the chapter has suggested that having a boat motor and having a gill net may be the reason why some Rama have different views about the best weather in which to catch fish. The difference may also be because of an interaction between both the boat motors and the gill nets—owning both allows some Rama to profit from the reduced competition for fish and/or the effect of the wind on the fish.

### **7.3: Reinforcing inequality**

This section will show how the interaction between the weather and possession of certain fishing equipment may reinforce the existing inequalities within the community of Rama Cay. The mechanisms for this reinforcement come from credit arrangements and overfishing.

During the interviews with shop owners, all of them were asked about what caused the number of customers buying on credit from their shops to increase or decrease. The shop owners linked the need for people to buy on credit to the weather conditions.

“[W]hen you say (.) the breeze [...] them is the time that sometime the people them go to me and say, “I need a bread”. They need like a 20 [Cordobas] or something and I does spread with them. And other time when the [fishing is better for them] them just pay me back.”

*Respondent #8*

It is fair to assume, therefore, that in the months of the year when the weather is very windy, some Rama who do not own a boat motor and/or gill net will not only struggle to catch enough fish to eat everyday but will also be increasing their indebtedness. During these same windy conditions, Respondent #8 – who is also one of the Rama who owns a gill net and a boat motor – will probably see the amount of fish he catches largely unaffected and through credit agreements linked to his shop he will also be owed money that he can recoup and reinvest at a later date.

Another way in which not having a gill net perpetuates inequalities amongst the Rama is through overfishing. Most of the Rama believe there are now less fish available than there used to be and many claim that the gill nets are the reason.

“The gill net [is] too big. It not allow fish coming in from the sea and reduces [the] lagoon amount.”

*Respondent #29*

Respondent #3 said that although he thought Hurricane Juana had reduced the amount of fish in the lagoon, the gill net was the main reason. Respondent #12 said that the Mestizo put their gill nets across the Kukra River mouth thus preventing fish from swimming up the river to where they would have otherwise been caught by the Rama who live in Tik Tik Kaanu and Sumu Kaat.

For those with gill nets, the interviews suggest this can have a dramatic impact on the yields of their catch during different weather conditions and they may also be able to



increase the variety and quality of the fish they catch in all seasons. This was illustrated by the previous quote from Respondent #4 (above, pg. 239).

If this is true that gill nets have reduced fish stocks in Rama fishing grounds, not only are those who do not own a gill net being disadvantaged in the short-term by not being able to catch the same quantity, quality and variety of fish as other fishermen, but long term the use of gill nets by others is also reducing the future availability of fish for them. This shows that certain fishing equipment could well be increasing existing inequalities amongst the Rama.

It would seem, therefore, that investing in these two items of fishing equipment could be a major boon to individual Rama fortunes, but there are reasons why some Rama do not invest in them.

Some Rama might choose not to use a gill net to fish. For example, they may not want to use them because of the damage the Rama claim they do to fish stocks in the Bluefields lagoon and the rivers of the Rama territory. Another reason might be that they may not be able to afford them. Respondent #18 used to have a gill net and is well aware of their benefits, but chose not to reinvest in one after his was damaged because of the initial cost of buying a new one. Others may be able to afford them, but don't want to take the risk should their other livelihood strategies fail. Respondent #4 discussed this latter point:

“So when [bad] things happen what are you going to do? Should I put money to buy more beans, or should I put money to build a net, or a hand net to catch fish? Then I [might] lose my money.”

*Respondent #4*

A boat motor represents a significant cost for most Rama families. Even a second-hand, low-powered model could cost around \$200 on the Caribbean Coast and there are associated fuel and maintenance costs. Gill nets are also very expensive to purchase and maintain. Possession of these items is thus likely to be a proxy indication of the respondents' socio-economic status. Respondent #31 confirmed this, saying he is in a different “economic situation” to other people on the island.

New technology tends to increase the inequality within society because those who can afford it or have greater endowments are more able to take advantage (Bannerjee and Duflo, 2011). A notable example of this happening was the Green Revolution:

“[W]hen a new agricultural technology... is introduced into a social system shot through with... power inequalities, it inevitably benefits only those who already possess land, money, credit ‘worthiness’, or political influence.”

*Singh (2001: 13)*

Differences in endowments can also be exacerbated by weather conditions. For example, during the 1997/98 El Niño, even though all Peruvians appeared to have similar access to official weather forecasts (Orlove, Broad and Petty, 2004), industrial fishermen had more capacity to take advantage of them than artisanal fishermen due to their resources (Broad, 1999).

The wealth scale based on the household survey data supports the assertion that those who own gill nets and boat motors were more wealthy than those who do not, but this is unsurprising given that possession of these items was included in the wealth scale calculation. The household survey income data does not suggest, however, that those who own this fishing equipment are wealthier than those who do not and these are the data normally used to calculate the HEA wealth groupings. Wealth is a very important determinant of how livelihoods are established and maintained (Maxwell and Frankenberger, 1992), but it may be that the original HEA framework’s reliance on wealth means it may sometime miss important factors that determine relative food security within a community; it does not consider reasons for inequality outside of stratification by wealth grouping. In the case of the three respondents who own gill nets and boat motors, it may be that they have prioritised the purchase of these items because they are closely linked to their primary livelihood strategy.

The three key individuals for this chapter (Respondents #8, #30 and #31) have livelihood strategies that are less reliant on subsistence activities than the other Rama interviewed whose views they contradicted (see Table 7.3 below).

Table 7.3: The livelihood strategies of Respondents #8, #30 and #31

<b>Respondent</b>	<b>Livelihood strategy</b>
Respondent #8	Runs a shop on the island, buys fish from artisanal Rama fishermen and sells them (and his own fish) to a multi-national seafood company; also involved in other market activities in Bluefields; has access to significant capital and resources
Respondent #30	Teacher in the secondary school on Rama Cay and therefore one of only 15 people on the island that receives a regular salary; member of one of the most well-off families on the island and therefore likely to have access to greater resources than most other Rama
Respondent #31	Employs similar livelihood strategies to those of Respondent #8; revealed that he sold his fish commercially and regularly traded other goods in Bluefields

Source: Author

It may be, therefore, that classifying households by livelihood strategy is a better way of disaggregating communities than the wealth groupings used by the original HEA framework as it would add a granular view of the communities studied without losing the data that would be collected if the communities were grouped by wealth. Categorising individuals by livelihood strategy rather than wealth would take longer, however, and so the rapid assessment advantage of the original HEA framework would be lost.

#### **7.4 Chapter summary**

This chapter has shown how certain weather conditions might impact the ability of the Rama to catch fish both in the short term and long term, and contribute to short- and long-term inequality. It is the second of the two chapters that represent Stage 3 (Impact) of the original HEA framework.

Some individuals own motorboats and gill nets and this means they are better able to catch fish in windy conditions. Those without these items are less able to catch fish in windy conditions. This has two effects, which are outlined below.

Firstly, it means there is a difference in the perception of certain weather conditions between those who own boat motors and gill nets, and those who do not. The former are able to catch fish when the weather is windy (which is when fish tend to be easier to catch) and so they see this weather as being ‘good’. In contrast, those Rama who fish

using the traditional methods of hand nets and sail- or paddle-powered canoes, are unable to fish in windy weather so they view it as being 'bad' weather. This is important because it shows that different families have a different relationship with the weather, meaning their responses are likely to be different.

Secondly, it means the weather conditions might contribute to the poverty cycle in which some Rama households find themselves. This is because the richer families who can afford motorboats and gill nets are not only more able to catch fish than the poorer Rama in the short term, but they are also contributing to the longer-term decline in fishing stocks, which is likely to hit the poorest Rama the hardest as they are generally more reliant on this calorie and income source.

Mirroring the findings of chapter six, this chapter has shown that even when the weather is the same, the impact on different households' food security could be different. It is possible these differences between the families could also reduce their flexibility to deal with certain threats to their food security and therefore contribute towards differences in their ability to adapt. Policymakers should seek to reduce inequalities of this sort. Inequality is undesirable for many reasons, including the harm it can cause to growth, development, the environment, and human health (Marmot, 2005; Godoy *et al.*, 2006; Wilkinson and Pickett, 2009; Bailey, 2017). This is especially important as in the context of food security, Sen's (1981) entitlement approach shows food insecurity is generally caused by an inequality in one or more of the elements of food security (availability, access, utilisation or stability).

In the findings outlined in this chapter, the heterogeneity within the Rama community is the stratification of endowments (boat motors and gill nets) held by individuals, which then influences their food entitlements in certain weather conditions. This shows wealth is not always the main determinant of vulnerability within a community, but that the interaction of social and economic factors with environmental change (or political ecology) has an important impact on the stability dimension of food security. This is not to be unexpected, but it does point to a limitation in the original HEA framework where difference is only measured by wealth. For this reason, it may be better to group communities by livelihood strategy rather than wealth. Although the original HEA framework does do this on a larger scale with its livelihood zones, the data presented in this chapter and chapter four show there is a large amount of internal variance in these

zones. Although breaking down countries into large livelihood zones is necessary for the original HEA framework because it is a rapid appraisal tool for the deliverance of appropriate food aid, more fine-grained analysis is required if longer-term policies are to be implemented without risking increasing inequality.

This focus on larger geographical areas, particularly in the climate change adaptation literature, means local-level differences are likely to be missed. For these Rama, decisions about which livelihood strategy to pursue and their willingness to take risk (however bounded by external forces) is also critical. As noted in the literature review, individuals still make their decisions based on their own experiences of the weather (Bryan *et al.*, 2013). It is important, therefore, to have an understanding of how individuals within the Rama communities make decisions in order to avoid introducing policies that might increase their vulnerability. This chapter has shown that there are different ways people talk about and experience the impacts of the weather on their livelihoods. Without having an understanding of how these types of inequalities function on the ground, this will be difficult to achieve. As a result, policymakers should aim to have a fine-grained understanding of these sorts of drivers of inequality.



## 8. Adaptations by the Rama

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The previous four results chapters in this thesis have represented the first three stages of the original HEA framework: the Baseline, the Problem Specification and the Impact stages. This chapter is mainly based on Stage 4 (Adaptation), which outlines how communities adapt to threats to their food security. It also touches briefly on Stage 5 (Projected Outcome) of the HEA by referring back to the foodways diagrams presented in chapter six (Figures 6.11 and 6.12). This chapter will show how the Rama have adapted in the past when faced with challenges to their food security such as those outlined in chapter five. It is structured around the adaptations themselves. They include increasing income by taking on extra salaried work, buying food on credit, replanting damaged crops or planting different crops, changing livelihood strategies, and changing how food is shared.

It will show how the adaptation of the original HEA framework used for this study is better suited for understanding what adaptations are potentially harmful. This chapter will highlight that the way the original HEA framework understands adaptation means it is less suitable for engaging with current debates in the literature. The original HEA framework's conception of adaptation means that longer-term policies may be overlooked because it privileges short-term coping strategies that are focused on replacing lost calories rather than addressing the wider reasons for a community's vulnerability to food insecurity. This is to be expected given the HEA's emphasis on coping, and it is not to say that certain forms of adaptation are invalid, but the chapter does highlight the importance of fine-grained understandings of communities when considering responses and policies to boost resilience. It will also explain how the findings in this chapter have wider implications for resilience theory, highlighting the importance of power, scale, space, and temporality.

### 8.1 Not adapting

Some Rama expressed a fatalistic attitude towards the weather. Many respondents initially responded to questions about what they did in response to weather or climate shocks by saying they couldn't do anything. When they were asked why not, the

response of Respondent #3, saying “it is the hands of God”, and Respondent #8 who said they “can’t do nothing”, were very typical.

These responses are echoed by the findings of other studies, usually those in places where institutional power is weak and the routes to contest power are poorly defined (Kenny, 2002). For example, Kenny’s (2002) Brazilian-based study of Sertanejos (disadvantaged people from the country’s rural interior), found that drought was seen as unchangeable and in God’s hands. Equally, Jahan and Wahab (2015) found that many poor Bangladeshis were resigned to “Allah’s will” in the aftermath of the food price shocks of 2007-08 and 2011-12; engaging in “continuous innovative practices to survive” (pg 60), but taking no action to transform their future prospects. Both Kenny (2002) and Jahan and Wahab (2015) argue this fatalism may harm a population’s ability to respond effectively because their resignation contributes towards reinforcing the status quo of unequal power structures. Applying this conceptualisation of fatalism is problematic, however, because it presumes the population has responsibility for their own ability to foster change (Bernard, Dercon and Taffesse, 2011). The results presented in chapter five suggest that the Rama’s vulnerability to food insecurity is determined to a great extent by processes they do not control, such as national land policies and climate change.

In the case of responding to climate threats, the reason why the Rama do not respond may also be because some Rama do not consider past climatic changes to have been exceptional or of sufficient magnitude to have to adapt. Some Rama said they have always been subject to change. For example, Respondent #11 said the climate has changed just like “everything change [...]; it cannot [always] be like first time”. Respondent #3 does not believe the climate has changed to an extent that the Rama will have to change their planting or fishing practices.

These responses have implications for how future adaptations might occur amongst the Rama community. It may be that some Rama do not challenge power structures or how they are enacted in the belief that it is already predetermined. This is likely to create differences between households and contribute towards greater inequalities within the community. This adaptation of the HEA was not able to determine the differences between households that lead some to not adapt in certain circumstances. Presuming that all households in the same wealth grouping would respond to a food security crisis



in the same way, however, is both a significant flaw of the original HEA framework and an issue if all communities in the same region are treated as being the same by policymakers and researchers.

## **8.2: Buying on credit**

If a family faces food shortages, the most common first response is to use money they have saved or food from a previous harvest, catch or purchase. The fieldwork suggested that the next step might be to then reduce their own consumption—perhaps through reducing luxury spending, reducing portion sizes, or in some cases skipping meals. More than half of all respondents said they typically did at least one of these at least once a week. In terms of adaptations to food shortages that are visible to others, however, the first option of most Rama when faced with food insecurity is to buy food on credit.

Most respondents who said they adapted to food shortages in this way said they bought food on credit before resorting to wild foods such as oysters and cockles. This contrasts with some literature that suggests families tend to exhaust their other resources (including wild foods) before relying on credit arrangements (Maxwell, 1996). It is possible this is because the Rama buy such a large amount of their food and so they always require a cash supply. It may also be because other wild foods are unavailable at certain times. This was shown in chapter seven, which showed many Rama who are unable to catch fish during windy conditions rely on buying food on credit instead.

“Them the rough time then when you [...] can’t go out and look [but] you have to buy. The waves them rough. Sometimes it rough so it mean you can’t go out. [W]e have a little rice and beans, but if you not have money [you] can’t buy [and] you can’t eat.”

*Respondent #11*

As mentioned in the previous chapter, credit is usually offered by other Rama families. These credit arrangements could, therefore, actually increase the inequality within the Rama communities by focusing power in the hands of those who already have greater access to cash. This is an example both of how socio-economic inequality within Rama

society multiplies due to endowment inequalities and of the importance of considering the political ecology of a community when investigating how households within that community adapt to threats.

Buying food on credit was found to be very commonplace amongst the Rama communities that were studied. Respondent #S59 – a shop owner living on Rama Cay – said that around 40 percent of her customers have a credit account with her at any one time. Equally, Respondent #13 – a shop owner living in Tik Tik Kaanu – said that her customers had an average of about 500C\$ (US\$18.50) each in unsettled (interest free) debts to her.

According to the interview with Respondent #22, it is not just shop owners that offer credit to the Rama. He claimed that families often have reciprocal arrangements with their neighbours or friends, saying “it is the same thing that we credit with one another”. There is no direct evidence to determine whether or not this exchange is based on balancing the differences between families that arise due to seasonal fluctuations in the relative success of different livelihood strategies.

As might be expected, the shop owners said that the most common times when families resort to buying food on credit is when the harvest or fish yield is poor. Generally the food bought on credit tends to be basic grains, such as rice and beans, though some respondents also mentioned breadkind and bread. It is possible these foods are chosen because they have the highest calorie density per cost of all Rama foods (though not the highest nutritional content) and because they are quite sensitive to the weather. It may be, however, that these foods are most sought after because of their cultural importance. As noted in chapter four, these foods were considered by some Rama to be ‘traditional’ Rama food. For the Mayanga of the Bosawás Biosphere Reserve in the north of Nicaragua, rice is an essential food. Many Mayanga believe they would die if they did not have enough rice, even if vastly more nutritional food, such as fish and meat, is available (Koster, Personal Correspondence, 2015). It could be that during a food security crisis, even households that would be grouped into the same wealth grouping by the original HEA framework and who follow similar livelihood strategies may choose to protect or prioritise different types of food, and therefore follow different adaptation strategies.

Buying on credit is a short-term strategy rather than a sustainable one. Respondent #S12 said that he bought food on credit just so he could ‘survive’ and that he still had some debts from the previous year he was paying off. Respondent #8 said that he didn’t limit the amount of credit that families could take out from his shop, but that instead the families who relied on him limited themselves. When they have borrowed what they think they could reasonably pay back, they will resort to using other adaptations. This form of credit appeared to be relatively easy to obtain, but most Rama did not mention taking out loans to purchase assets that would then generate enough to pay back the loan. Respondent #4 confirmed that formal loans from a bank are very difficult to acquire for the Rama, commenting, “I don’t know which bank would give [us] credit”.

This strategy can be classed as a resilience adaptation according to Pelling’s (2011) conception of adaptation. This is because although it allows the Rama to cope with food shortages, it can expose families to further harm in the future and does nothing to unravel the socially unjust practices that have contributed to their vulnerability in the first place. Certain Rama household’s future ability to adapt will be constrained by their level of indebtedness. For example, if food prices change, some individuals within the Rama community will be worse equipped than others. In contrast, those who lend money will have greater autonomy to invest in profitable areas. This shows that if adaptation is assessed at the level of institutions, rather than at the level of the household, the importance of how institutions can cause inequalities might be missed. It also shows that the resilience of certain individuals is closely bound to their initial vulnerability—if they have less money available, their responses to threats to their food security are more restricted.

The original HEA framework would classify this adaptation as being harmful, but would not consider the extent to which it would fail to address existing inequalities. In fact, it is questionable as to whether this point would be picked up through the original HEA framework (with its data largely collected from a focus group with 6-10 individuals), as it was not until some of the later in-depth interviews were conducted for this research project that the inequality of Rama credit arrangements was recorded. Certainly, the original HEA framework would not have been able to consider the varying levels of debt held by different households within the same wealth grouping.

### 8.3: Adaptation as “waiting”

A number of Rama families that produce their own food have adapted their planting practices in response to changes in the weather and other threats. This section will explain how the Rama “wait for the right time” to plant their crops. Respondents #10, #11 and #26 all said that whereas the previous generation would plant at the same time every year with confidence that the weather would be suitable for their crops, they now have to be more reactive. These three respondents said they don’t plant beans and rice immediately if they think the weather is going to be bad as they are very susceptible to poor weather. Instead they wait for the time to be right:

“If you see it going to be cut down with rain, you have to wait because otherwise it be burn. If not wait [there is no point planting] ‘cos [it] not grow.”

*Respondent #11*

This response has been noted in other literature. Berkes and Jolly (2001: 7) describe waiting as a coping strategy, explaining how the Inuit community they worked with in Sachs Harbor, Canada “wait for the geese to arrive, for the land to dry, for the weather to improve, or for the rain to end”. They reiterate the argument of Krupnik (1993) who said that living in these environments is a “series of adaptations” (Berkes and Jolly, 2001: 9). Maxwell (1996) stated that coping strategies such as these can become part of the fabric of a community’s livelihood strategies. This response allows the Rama to cope with food shortages, but does not address the wider political-economic dynamics that created their vulnerability in the first place (Pelling, 2011). Within Pelling’s (2011) conception of the different pathways of adaptation, this response fits most closely into resilience adaptation.

Although climate variability does constrain the Rama’s planting regimes, their vulnerability is co-produced by both the environment and society (Taylor, 2016)—some families have more resources to be able to cope with this variability than others. The resilience of the Rama is therefore fundamentally linked to their social vulnerability and this supports the conception of vulnerability and resilience being rough antonyms (Adger, 2000; Barnett, Lambert and Fry, 2008; Mochizuki *et al.*, 2018; Wilson, 2018).

As noted, the Rama do not follow a homogenous livelihood strategy. Some families will feel the impact that the climate has on certain crops differently. In this case, all those families that rely predominantly on fish and buy the rest of their food are less likely to be affected by the impact of precipitation on crops. Any adaptations that seek to improve the lot of Rama farmers may not improve the lives of those families whose livelihoods are more reliant on fish. It could even affect them adversely by creating another source of inequality that is dependent on the extent to which farming forms a part of each Rama family's livelihood strategies. The original HEA framework's focus on wealth groupings rather than livelihood strategies means that it would have missed this nuance and may have contributed towards advocating ineffectual policies.

#### **8.4: Replanting or changing crops**

The most common adaptation used by farmers when their crop fails is to replant the same crop. As mentioned in Section 8.2 of this chapter, when this happens the farmers will typically buy food on credit and later rely on wild foods or other livelihood strategies until the new crop is ready to harvest. Families that responded to crop loss in this way expressed a sense of helplessness, similar to the fatalistic expressions mentioned in Section 8.1 of this chapter. Respondent #9 said there was “nothing we [can] do. We just plant them back” and Respondent #6 made a similar comment:

“Well what we do? We have to plant again the crops [...] because we not going to solve [the loss of crops]. We have to try that [again]. We turn back again and make a next little plantation.”

*Respondent #6*

As previously mentioned in chapter five, the opinion of Respondent #S94 is that replanting crops again overworks the land the Rama have to exploit and increases the chance of future crop failures. As stated by Riverstone (2004), the land on the Caribbean Coast is generally quite poor for agriculture and although most Rama plant on the better alluvial soils closest to the rivers, there is a great deal of pressure on this land, partly due to the encroachment of the Mestizo into the Rama territory. Planting crops back in this way might achieve the aim of food resilience – recovering from or enduring shock (Lang and Barling, 2012) – in the short term, but could cause long-term

harm. This shows the importance of the temporal element of vulnerability, which is one of the weaknesses of resilience theory generally (Misselhorn *et al.*, 2010).

Five families said they have changed the crop they plant because of the frequency or extent of previous crop failures. Respondent #S86 has stopped cultivating corn and started to grow banana and cassava because he considered these latter crops to be less susceptible to the weather. It is possible, however, there was a financial consideration to this decision as, based on observations, banana and cassava are likely to generate a greater profit than corn. Respondent #S94 said that he has changed what he plants on a number of occasions when a particular crop has failed. Respondent #S86 has stopped cultivating corn and started to grow banana and cassava because he considers these crops to be less susceptible to the weather. This is supported by Respondent #S80 who also considers cassava to be a hardier crop and so switched from cultivating beans. Rama plantation owners frequently cited beans as being the least climate resilient food crop. Respondent #S93 said he chose not to plant beans in 2016 because he had found it to be too risky in the past and Respondent #29 said he no longer plants beans or cocoa because he knows they always ‘burn’.

This adaptation is similar to farmers in Madiama in Mali who plant both sorghum and millet (which have different tolerances to rainfall) and then cut down one of these early depending on the rainfall level (Crane, Roncoli and Hoogenboom, 2011). For these families, the responses that they are able to choose (which partly determines their resilience) are bound by the same factors that determined their initial vulnerability—in this case the interaction between their crop and the environment. This point again supports the view that resilience and vulnerability should be considered to be rough antonyms of one another. Having said this, there is still scope for households to make different decisions (as shown in the varied responses depicted here) and this shows the importance of conducting research that is designed to tease out and consider local-level heterogeneity.

Rickard and Howden (2012) argue that changing the crops that are cultivated represents a ‘transformative’ adaptation. Pelling (2011) in contrast argues this would be a transitional adaptation as it involves claiming rights that the Rama already possess and does not seek to challenge current social practices or the existing cause of vulnerability. The way in which the respondents in this section present the decisions they made to

change the crops they cultivated suggests the decisions were made autonomously, but it is likely that the choice about which crop each Rama family cultivates is dependent not only on political, economic and societal constraints such as the price framework of certain crops, but also on their own knowledge of the new crops and their ability to cultivate them. For this reason, certain households are likely to be excluded from using this adaptation.

This can be seen from the response of Respondent #S20. He explained that an NGO had told them how to plant their crops in a more effective manner by planting the seed in neat strips rather than scattering it randomly. He could see that this was a more effective technique, but it was not practical for him and his family to implement. He said that planting seeds in this way without mechanisation is very labour intensive. Because he and his brothers also had *chambas*, were studying in Bluefields, caught fish, sell their produce and have to take care of their ageing father, they were unable to dedicate the amount of time needed for this technique. Arguably then, the factors that determine this family's vulnerability also determine their resilience.

This example shows the importance of considering local complexity and difference. Policymakers should be aware that some households are unable to use certain approaches, even if they are aware that they are likely to be better, because of their personal circumstances. These personal circumstances are not always connected to wealth. The original HEA framework would have been unlikely to reveal situations such as this one. Even within the same wealth group, the Rama are likely to have very different constraints on their ability to respond to threats. Moreover, these sorts of personal circumstances are not always entirely related to livelihoods (outlined in chapter four of this thesis) or endowments (outlined in chapter seven of this thesis).

This example also shows that policies to boost the general resilience of a community could cause greater inequality as some groups of people are left behind because of their inability to respond in the way as others.

## **8.5: Livelihood strategies**

Livelihood strategies have been mentioned in this chapter, but changing these could also be considered a separate adaptation “strategy”. As noted in the literature review, Rickards and Howden (2012) consider a diversification of income to be a transformational adaptation. This section will discuss seasonal or long-term changes in livelihood strategies and also discuss the reduction in reliance on traditional livelihood strategies and the embrace of the wider jobs market by certain Rama individuals.

Chapter four showed that many Rama families rely on selling their own produce, game or seafood. The findings of chapters five and six showed that the key causes of food insecurity are often those that affect Rama families’ incomes. If food availability is reduced, the impact will be felt primarily through a drop in income rather than a drop in the calorie contribution of these items to their diets. The Rama often plug these income gaps with short-term, informal jobs (chambas).

As explained previously, work in the Caribbean Coast region is often seasonal and difficult to find and many Rama will take jobs whenever they become available. This competition is heightened, however, when there are crop failures or a drop in fishing stocks. Respondent #S94 said that when his crop fails, he has no choice but to take a chamba to earn enough money to be able to buy food. Respondent #S53 explained that he had done some informal work – including chopping wood and clearing land – for both Mestizos and non-Nicaraguans to replace the income lost when his crop failed. Doing this sort of work is suggestive of resilience adaptation—using the income as short-term compensation for when there are food shortages (Pelling, 2011).

The fieldwork data suggested, however, that some families are choosing to shift their focus to waged employment. Respondent #S47 provided a useful example when he stated that his family used to hunt, but that in the last eight years the animal population in the Rama territory has dropped to the point where it is becoming more difficult to hunt them. He said that where he used to live, there was so little “hunting left” that he and his family moved to Rama Cay so that he could look for a job. Because of food shortages, this family has moved away from its more traditional Rama livelihood strategy towards one that relies more on the labour market.



This has been a fairly common occurrence in recent years. Respondent #4 states that as the risk of traditional livelihood strategies has increased (largely due to reduced yields, though sometimes because Rama families have been forced off their land by Mestizos), many Rama have been faced with a choice.

“Some of [them] say [...] I am going to make a business instead [...] or get a job because it’s much easier than to reap corn.”

*Respondent #4*

This is representative of a shift within the Rama community – particularly those living on Rama Cay – of a move towards more market integration. Rama Cay is the closest community to the jobs market of Bluefields and chapter four showed some evidence that the Rama who live on the island are more engaged with the market than those in other communities. Moving in an attempt to take up jobs elsewhere would be classified as a transitional adaptation according to Pelling (2011), because it involves claiming rights that the Rama already possesses—the right to migrate.

For many Rama families, there exists a tension between focusing on traditional livelihoods versus engaging with the market economy. For example, many of them – most notably those living on Rama Cay – may have to choose between maintaining their land and furthering their education in order to access the job market. Respondent #25 works as a teacher in the primary school on Rama Cay. She explained that when she was younger, her family owned a farm. When she was old enough to start working on the farm, her father insisted that she and her brother go to school to further their education. Because they were busy studying, they were unable to tend their land properly and it was taken over by her uncle.

While the family of Respondent #25 may not have known that losing the farm would be the result of choosing to focus on the children’s education, this is a fear of other Rama. Respondent #19 was asked about her future ambitions and her response is worth quoting at length because it shows how the competing interests of land ownership and furthering education are rationalised as opposing opportunities.

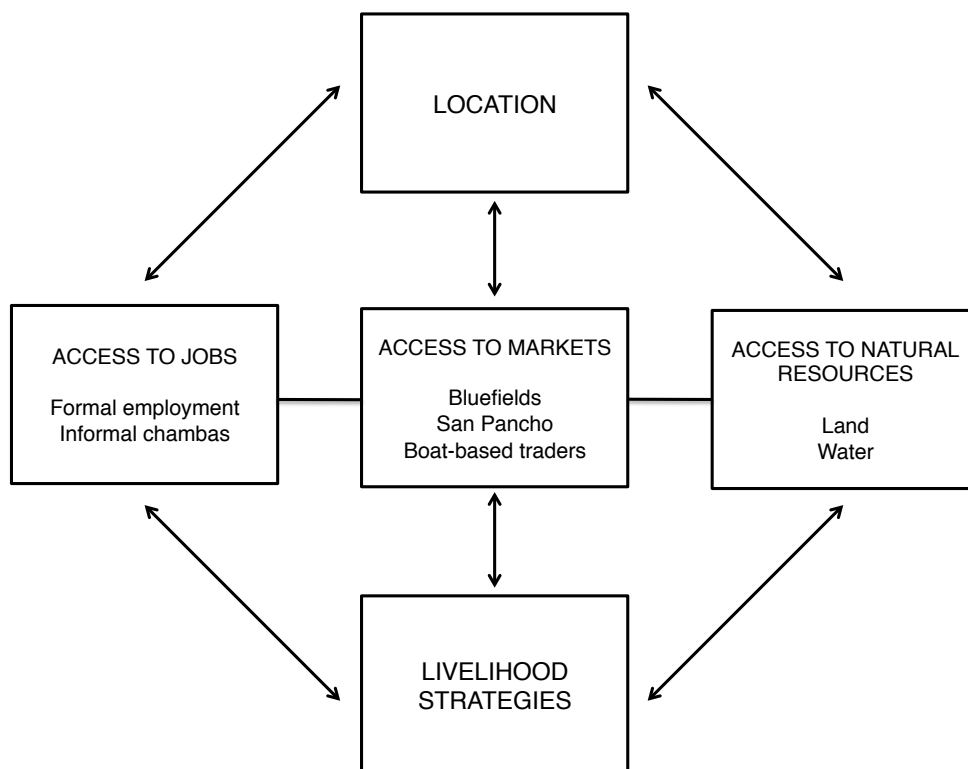
“Well for me, first [ambition is to] go school. If I can’t study then to have some big land, some farm for my children. I think [focusing on] the farm be better. I take the land before we lose it. It better we use that land, because if we leave that land [the Mestizos are] going to take it over. Right now them out there on the beach side [ready to move here]. They take and not ask nobody. They just go and chop and chop and chop, and plant the food. Those things going on!”

*Respondent #19*

Regardless of each Rama farm owner’s level of market integration, most still wanted to maintain a connection to their land; consistent with aspects of indigenous cultural identity (Cunningham and Stanley, 2003).

Figure 8.1 (below) attempts to show the push and pull factors that may account for the migration of Rama between the three communities studied. For the purposes of this section, the differences between the three communities (previously highlighted in chapter four) have been broken down into their access to jobs, markets and natural resources.

**Figure 8.1: Potential factors governing the internal migration of the Rama**



Source: Author

In the figure, the arrows going to each of the central boxes from the 'Location' and 'Livelihood Strategies' boxes have arrowheads at either end. This is because there are potentially two different readings of how these differences between the communities have occurred. It may be that the locations of the three communities have meant that their residents are afforded different opportunities and experience different disadvantages when it comes to their access to markets, natural resources and jobs. As a result of having a particular level of access to these three factors, therefore, the livelihood strategies of the residents in the three communities are different. This suggests that individuals within these communities are constrained by both the location of the community they live in and by extension the political-economic dynamics and societal constraints of the region. These factors therefore determine both the vulnerability and resilience of the Rama households.

An alternative reading could be that households (and perhaps also individuals within households) have "chosen" to follow certain livelihood strategies because of their abilities, personal ambitions or because they had no other alternative. The livelihood strategies they "chose" determine what they require access to (markets, natural resources, or jobs) and they have therefore moved to the community they feel best affords them this access. The migration of the Rama creates an extra level of complexity to this because this migration is a part of their traditional livelihood strategies (Riverstone, 2004).

It is possible that both of these viewpoints are true and which one is most true varies by household. From a general point of view, the ability of the Rama to find work will be affected by their relatively poorer access to Bluefields and other locations where they may seek work (the rest of the Caribbean Coast, the Pacific coast of Nicaragua and abroad) relative to other Costeños and their relatively poorer access to resources including credit and education. As noted in the work of Pineda (2006), the Rama (alongside the two ethnically Afro-Caribbean groups, the Creole and the Garifuna) have an advantage over some other Nicaraguans because of their ability to speak Creole English which may allow them to find work on Caribbean cruise ships.

There was some suggestion in the data that some Rama were not considered "real Rama" or of belonging to a particular Rama community and so they were passed over for jobs and other opportunities by the Rama leadership (following interviews with

Respondents #34 and #25). This hints at the possibility that some individuals were disadvantaged by their position in society, suggesting that factors such as location may be the determining factor in the livelihood strategies that the Rama choose. This clearly shows the importance of considering ‘space’ when investigating heterogeneity in the context of the Rama’s food security: the geography of where the Rama communities live directly impacts upon their vulnerability.

Some families were able to circumnavigate these constraints, however, as seen with one family<sup>1</sup>, who established their own business and personal relationships with non-Rama individuals to ensure their exclusion had less impact on the livelihood strategies they used. This suggests that for some individuals, there is more choice about what livelihood strategies they pursue.

Finally, as noted in chapter seven, there are limits preventing every individual from following the same trajectory. For example, many Rama believe that commercial fishing has already caused significant damage to the sustainability of fishing stocks in the Bluefields Lagoon and the rest of their territory. This means it is likely that if all Rama were to fish commercially this would not be sustainable because fishing stocks would be even more damaged than at present. This suggests that although a certain strategy may boost the resilience of a few people – through increasing cash reserves and building trading relationships – it may not be an effective strategy for all Rama in the long term. This highlights the importance of considering the scale of resilience.

This section has also shown that the resilience of an individual or group is inextricably bound to their vulnerability. Although a resilience response may occur after, before or during a perturbation, they are spatially and temporally bound to the same factors that caused the initial vulnerability, such as the individual’s or group’s endowments, connections and relationships to others, and the place where they live.

The original HEA framework is not designed to be able to understand the amount of complexity in livelihood strategies that are discussed here. All individuals within the same wealth grouping are presumed to have equal ability to use the same adaptation strategies. Even for short-term interventions to address food insecurity, this assumption

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<sup>1</sup> This household is not given a respondent number here because this description does not conceal their identity and they would be revealed as the source of all the comments that are attributed to them elsewhere in the thesis.

is problematic because it risks ignoring the needs of people that are more vulnerable because of hidden disadvantages. This highlights the importance of having a fine-grained understanding of a community when studying food security.

## **8.6: Sharing**

Sharing has been included as an adaptation strategy in this thesis for three reasons. Firstly, many Rama families receive at least some of their food this way, as established in chapter four. This means that what happens to this supply of food when food security is threatened is important to understand. Secondly, sharing within a community makes a difference to the original HEA framework's interpretation of how households respond to threats to their food security. If Rama families do not share in times of food insecurity, then this removes one presumed response that would be included in the decision-making processes for food security policies. Contrary to this, if the Rama always share in times of food insecurity then it might be expected that the inequalities within Rama society are less significant and therefore the wealth groupings used by the original HEA framework are less appropriate. Thirdly, if sharing does reduce when food security is threatened, this challenges the academic literature that tends to see sharing as something that influences vulnerability to risk, rather than being an adaptation in itself. It is possible that this difference stems from the fact that studies of food sharing amongst indigenous groups have generally been based on short, specific time periods, rather than considering how sharing practices have changed over time.

The section will first outline current sharing practices, showing that many Rama now share less food when there is less available, and then compare these to past sharing practices. This is done to argue that the Rama have broken the social contracts that previously governed the sharing of food and discuss the reasons for this change. This has implications for studies based in resilience theory that have privileged 'institutions' – the behaviours, norms and rules of a society – as being the most appropriate scale to judge success because it shows that institutions can change. As a result, a fine-grained understanding of how behaviours, norms and rules of a society are enacted at the household level is required in food security research.

### *8.6.1: Current sharing practices*

There appears to be four general conventions about how food is presently shared by the Rama and this sub-section is structured around them. Firstly, the Rama tend to share less food when there are food shortages. Secondly, they generally share more with their own friends and neighbours. Thirdly, food is sometimes shared as part of a business or collaborative deal between families. Finally, food is usually shared during important special occasions (notably Christmas and Easter), or if the food is considered to be special. This sub-section is structured around these conventions.

#### *8.6.1.1: Sharing less*

There is evidence to suggest many Rama only share food with others when they have more food than they need for themselves. For example, Respondent #14 said that “when not got much we not share”, Respondent #25 said that they only share a little bit with their neighbours when they have “plenty”, and Respondent #S105 said that when they bring in the harvest, “you’re welcome to take from mine now”. This concept was also linked to food shortages caused by a lack of income. Respondent #34 said that when his son – who works for a national fishing company – has enough money for his family, he sometimes buys more food than he needs and will share it with his neighbours. The implication is that if his son is facing a food shortage himself due to a reduction in his income, he will not be able to help out his father. It could be argued therefore that reducing or curtailing the amount of food shared is an adaptation to food shortages. It is, however, only a short-term response to the threat, and could be harmful longer term because it does not address the underlying reasons for vulnerability.

Not all Rama said that they reduced or curtailed how much food they shared based on whether they were struggling or not. Respondent #S94 explicitly said he shared regardless of his personal circumstances, while Respondent #27 said that even when they don’t have enough food for themselves, his wife will share with others. Equally, some of the older respondents, who could remember the impact of Hurricane Juana, felt that if a similarly catastrophic event occurred, all the Rama would come together as they had done then. Respondent #16 said that the Rama “would unite” if they were threatened by such a catastrophic event again.

### *8.6.1.2: Friends and family*

Most Rama said that they and others generally share food with their family. For example, Respondent #S44 said she shares fish with her sisters, while Respondent #29 said he receives a “ration” of fish when his sons catch it in return for some of the breadkind he shares with them. A number of Rama also share with their neighbours. Respondent #24 spoke about a reciprocal relationship with her neighbours that involved frequent, though not daily, food exchanges. Respondent #20 said he shared his fruit amongst his neighbours, possibly because they had too much to consume themselves. Because of the seasonal nature of fruit production, this sharing behaviour does not occur year round. Respondent #11 said she shares with “those that around [my] home”.

Sharing in this way, which is consistent with the reciprocal altruism model of food sharing, relies on strong, trusting relationships. As noted previously, a number of respondents said they felt as though trust had declined within the Rama community in recent years and so this may have affected this type of sharing. It is worth mentioning that the residents of Sumu Kaat were more likely to say there was a strong bond of trust within their community than Rama Cay residents and more Sumu Kaat residents said they shared food in the traditional way than did Rama Cay residents. This difference may, however, result from the size of the communities: research has shown that food sharing is more commonplace in smaller communities (Koster and Leckie, 2014).

Respondents #31 and #32 said they share food with their neighbours every day. Additionally, Respondent #S91 said he sells coconuts to the market in Bluefields, but still occasionally shares them with other households in Tik Tik Kaanu. Respondent #26 said she likes to share food even with those who are from outside the Rama community.

There is also evidence that some community-wide sharing still occurs through the Moravian church. Four respondents spoke about how the church aims to help older or infirm residents with food. Respondent #3 explained the ministry on Rama Cay:

“We take into our consideration for share with the [...] sick [and] the poor [...] because we have the people that are real poor [and] they cannot help themselves. So we decide to make that great work to carry a small thing to them [...] So we decide according to the needs of each family. Maybe, she is sick or she is widow [or] maybe she’s old, [then we] carry things for them.”

*Respondent #3*

As noted in chapter four, Respondent #12 lives entirely by the support of other Rama. She explains that the pastor of Tik Tik Kaanu “[asks] the people them to give me something, so all the house [...] collect something up and send something.”

These data show the importance of having a fine-grained understanding of how food is shared. Within the context of the original HEA framework, it is likely that Respondent #12 and the other Rama mentioned by Respondent #3 as recipients would be included in the lowest wealth group with all the other Rama, thus obscuring the heterogeneity in food sharing patterns that exist within the community and the households’ subsequent varied vulnerability.

As mentioned in the methodology chapter, food aid was provided by an NGO during the fieldwork period and was distributed evenly amongst the Rama community (Personal Observation, 2016). This, however, was a very infrequent occurrence; most Rama either stated it had last happened more than two years ago or they struggled to remember the last time. No specific reason for when the food was distributed was given by the NGO, who stated it was distributed when they received it from the US donors and they had sufficient transport to be able to take it to all the communities.

#### *8.6.1.3: Business or collaboration*

Some Rama share food as a result of a business or collaborative relationship with another individual. For example, Respondent #S20 grows beans and said he will occasionally give a slightly larger amount to a customer as a gift if they have shared with him in the past. Equally, both Respondent #3 and Respondent #6 explained that families who do not own dories will give a small amount of their catch to the owner of the dory instead of paying cash to rent it, as explained below:



“We just pay them the [catch]. Give little bit [...] Usually what we bring we have to prioritise it to them for eat. [They’re] not obligated [to accept it, but] if them want it them take it”

*Respondent #6*

Scholars state shared food can be reciprocated through labour, non-food items and even cash (Koster, 2011; Nolin, 2012). It is possible, therefore, that even within a sharing relationship between families, sometimes shared food is reciprocated later by other means. The key characteristic of sharing is trust—in this case an expectation that food given will be reciprocated in some way at a later date (Gurven, 2004).

#### *8.6.1.4: Special occasions and foods*

A commonly mentioned convention was the sharing of food at special occasions. This takes place most notably at Easter and to a lesser extent at Christmas.

“For [...] Easter Sunday, that mean we have like some buns and cake and fresco for share them with the neighbours them. [On] Easter Monday, that is when everybody [...] come together [...] and make a big picnic.”

*Respondent #6*

Some families said they are more likely to share food with others when they have “special” or unusual food. For example, Respondent #30 said she shared food when “I cook different”, which was a sentiment shared by Respondent #3. Respondent #6 named seasonal food such as iguana eggs as the type of food they would be more inclined to share with other people. This does not appear to be because there is no commercial value for these goods, however, as the families who acquired these items were observed selling them. When I returned to the subject of iguana eggs later in the interview with Respondent #6, another Rama man overheard and asked if they had any available to buy. Further observations suggested it was evident that iguana eggs were a rare treat for the Rama.

### *8.6.2: Sharing practices in the past*

This sub-section will outline how the Rama used to share with one another and discuss why there is a difference between present and past sharing practices. It will show this shift has been caused by a number of reasons including the reduction in the amount of food resources in the Rama territory, the change in the amount of food that needs to be bought (for which there are likely to be a number of reasons), and the loss of community unity. It will show that food shortages in the past have meant the Rama have broken the social contracts that used to govern the sharing of food in order to provide themselves with another option in times of stress.

#### *8.6.2.1. Changes in sharing practices*

Most of the respondents were in agreement that food sharing is now much less prevalent amongst the Rama than in the past. Generally, Rama Cay residents were much more likely than residents of the other two communities to say they shared less food than they used to. Respondent #5, an older Rama Cay resident, said that she still saw people share food in the community, but that now “is different from when I be small”. It is worth quoting her at length:

“We used to share the meal. We used to share the manantí, they used to share shrimp, they used to share fish. When my father was the pastor [he] wouldn’t buy anything. [It was] dependent on, if I give you, you give me [and] I give next one. [W]e use to give it all to close neighbours and all the family.”

*Respondent #5*

These comments suggest that the sharing of food within the Rama communities was based on the principle of Reciprocal Altruism – people shared in the expectance that the person they shared with would return the favour (Gurven, 2004). Although family is mentioned, there is a suggestion that, then as now, selection was not just based on kinship because “close neighbours” were also included.

It is evident that sharing food with one another used to be a fundamental part of the Rama culture and its traditions with food shared freely amongst different Rama families

regardless of their profession or individual success. Nowhere is this clearer than through the legend of “Shanda” that surrounds the catching of manatee. This legend – outlined by Saloman (2012) – says a Rama man will be informed of the location of a manatee through a dream. When a manatee is caught, the community should have a celebration that lasts three days during which elders prepare the manatee meat to be eaten. The best parts (the breast meat and ribs) should be given to the hunters, while the rest of the meat is shared amongst all the Rama and the head is boiled to make soup. The meat must not be sold. If this is done, or errors are made, such as the bones being eaten by hunting dogs, the hunters can expect bad luck.

It is clear from the interviews that the catching of manatee no longer follows this tradition. While Respondents #5, #7, #14, #20 and #24 disagreed about when the last manatee was caught by the Rama (generally longer than a year ago), all agreed that the meat was sold rather than shared.

“One time [...] when them kill the manantí [...] that is a sharing [for] everybody. The bell just ring and then the children just go from house-to-house and [the Rama] them cook that together [...] But now if you not have the money then you not taste it.”

*Respondent #7*

The interviews also suggest the meat from all animals that the Rama hunt or fish used to be shared, but now it is sold instead.

“[O]ld people say for example a man hunt the animal and bring it home, then he just share. Now if anyone get an animal they bring it and have to sell it. They sell it instead of share now, so [...] that is practically like losing, losing the habit of sharing food.”

*Respondent #23*

It appears as though this is the case for all food groups, not just for meat.

“In old time days if you had a coconut or a banana, you share. Now these days, nobody share. My mama used to bake and when she had one small cake or bread she [shared it]. When my father came from the bush with a sack of coconut, all the neighbour [received some].”

*Respondent #28*

These quotes suggest that food is now more likely to be sold than shared amongst the Rama. This gradual move towards greater market integration has been under way for a number of years. Riverstone (2004: 21) noted during fieldwork conducted in 2000 that the “economically egalitarian nature of Rama society [was] changing”. Although it is not inevitable that Rama society will continue to increase its level of market integration as not every society does (Ziker, 2002), it is reasonable to expect it will. This process is likely to be accelerated when the new road from Managua to Bluefields is completed. This is because it will enable cheaper transport of good, services and people to and from the Pacific coast.

#### *8.6.2.2: Reasons for the changes in sharing practices*

Greater market integration is one of a number of likely reasons why the Rama no longer adhere to sharing conventions. Others include a reduction in the amount of food resources in the Rama territory, the change in the amount of food that needs to be bought (as opposed to the choice to buy more foods and for which there are likely to be a number of reasons), and the loss of community unity and trust. In essence, all three of these have made Rama households more guarded with their own resources making them more likely to sell or preserve their excess food rather than share it.

As outlined in chapter six, the Rama strongly believe there are fewer natural resources, including food, than there were previously. The evidence presented in sub-section 8.6.1 (above) suggests there is a clear connection between abundance and the frequency of sharing. Many Rama only share when they have more food than they need for themselves. When explicitly asked why food is shared less now, many Rama interviewed cited the availability of food as being the most important reason. Among others, Respondents #2, #5, #22, #32 and #38 in particular shared this view. It is worth quoting Respondent #32 at length:

“It change a lot now, not like first. So that’s why it hard. Maybe say you find [...] some Rama people them good in fishing, so them focus all them effort in that food and not share it [because of] the change through the difficult situation.”

*Respondent #32*

Another reason that was given by the Rama for the decline in sharing was the impact of having to purchase the majority of what they eat and the increased cost of food. Respondent #23 explained that on Rama Cay, “everything is money, just like Bluefields [...] they don’t give that to share.”

This shift towards purchasing more of their food has likely occurred due to two reasons. Firstly, the Rama have to spend money to acquire things they want and need that in many cases they previously didn’t need money for. This includes clothing<sup>2</sup>, fuel, medicines and certain popular snack food items. Secondly, there has been a shift in tastes, following the global dietary shift (Popkin, Lu and Zhai, 2002), particularly amongst the younger generation. This was evidenced by the Respondent #4 who said his children prefer to eat “Bluefields food.”

These changes mean the Rama are more focused on obtaining money for their labour and the goods they produce than they were previously. This is evidenced by the quote from a Tik Tik Kaanu resident below:

“Now if anyone get an animal, they bring it and have to sell it. They sell it instead of share now. [That] is practically like losing [...] the habit of sharing food [...] People prefer to have money [and] sell their product instead of sharing. [If] you want have my food, I sell you.”

*Respondent #2*

Some Rama claimed they have less money because there are fewer jobs (#7) and because things are more expensive (#16). Respondent #32 said it was “hard for share” because meat and sugar is so expensive now. The implication was that they no longer have enough money to buy more food than they need themselves.

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<sup>2</sup> The Rama used to wear clothing that was distinct from the Western-style clothing sold in Bluefields, but the cost (both in terms of money and time) to produce their traditional clothing means that all Rama now buy and wear Western-style clothing

This suggests that the more communal sense of ownership that used to exist amongst the Rama has been replaced by a greater sense of private property—the Rama now consider what they catch to be theirs to exploit. This shows the problem with a conservative view of resilience that promotes current neoliberal trajectories. As can be seen in this example, greater neoliberalism can create a more individualised stratification of risk, which is likely to increase inequality and adversely affect the most vulnerable in a given population (Joseph, 2013; Welsh, 2014). This is important because many climate change adaptation policies are focused on boosting resilience through greater engagement with neoliberal solutions, such as increasing market engagement or increasing crop share intended for export (Yamane, 2009; Bassett and Fogelman, 2013).

Both the decrease in the amount of natural resources and the shift towards buying more food has meant that even if families do have enough to share, there is an increased likelihood that the family they share with will be less likely to be able to reciprocate. This has meant there has been an erosion of the trust relationships that are essential in the sharing of food and in the sharing model of reciprocal altruism in particular. This contrasts with the Yaka in the Congo river basin for whom consumption is more valued than accumulation—they will share even when there is no need to do so (Lewis, 2008). Lewis (2014) argues that food sharing is essential to prevent damage to ecosystems, because individuals who accumulate more than others are able to use goods to exercise authority or influence others. There is, therefore, a clear link between reduced amounts of sharing and greater inequality.

This fear that shared food would not be reciprocated was expressed by Respondent #22 who said, “Well we afraid. We afraid first with neighbour if [we share], sometime they not share [because] sometimes have [...] hard time”. This sentiment was shared by a number of respondents. Respondent #34 was specifically against sharing food with anyone who was not related to them. She said that her family don’t share with others because they never share with them. Some respondents (Respondent #s 5, 7 and 29) believe the causal direction goes the other way—that the reduction in the amount of food sharing between the Rama was because they were no longer united as a community. As outlined in the literature review, the Reciprocal Altruism model of food sharing is reliant on the building of a relationship between two individuals. An individual or household only needs one interaction with another non-kin individual or

household to determine whether they are prepared to reciprocate (Wilson and Dugatkin, 1991), but a long term sharing arrangement presumably relies on trusting the other individual to always reciprocate.

The evidence from the respondents suggested that food was shared more readily in Tik Tik Kaanu and Sumu Kaat than on Rama Cay. Respondent #23 said that Tik Tik Kaanu residents shared more than Rama Cay residents and Respondents #36 and #39 said the same for Sumu Kaat. The different levels of marketisation between the three communities (as shown in chapter four) may explain some of this difference. Rama Cay residents buy a higher percentage of their total food than do residents of the other two communities and so it is likely they are more reliant on the cash economy. As a result, Rama Cay residents may be more likely to see the resources they have acquired as their own private property to sell rather than sharing them with the community.

Another reason why Rama Cay residents may be less likely to share food than the other two communities is because of the population sizes. Some studies have suggested that communities with larger populations are less likely to share food than those with small populations (Gurven, 2004). Three respondents (Respondents #23, #36 and #39) said they thought people in Tik Tik Kaanu and Sumu Kaat were more able to share with each other because they had closer relationships due to the smaller size of those communities.

Finally, there was a suggestion that those Rama who focused more on fishing tended to share more than those who focused more on farming. Respondent #29 explained that the Rama hardly work together to plant in the bush (other than employing each other directly). This is because it is difficult to decide on how the crops should be divided as the amount of time and effort each worker needs to put in over many months will vary a great deal. In contrast, Respondent #29 said that the Rama who fish tend to work together more often because the reward for their labour is immediate. This means the spoils can be divided easily at the end of the day based on the remembered relative contribution to the catch. As a result, fishing tends to facilitate more sharing because debts will be accrued quickly and food sharing (or the sharing of other items including fishing technology) can be used to address this balance. The evidence presented in chapter four suggested that the residents of Rama Cay tend to fish more than the other two communities, and the residents of Tik Tik Kaanu and Sumu Kaat tend to farm more

than those who live on Rama Cay. This would suggest that those who live on Rama Cay are more likely to share than those who live in the other two communities. Because the reverse is true, however, it is possible that the seasonal nature of farming and fishing has an important impact on sharing, and/or the other possible reasons why Rama Cay residents share less than the other communities (outlined above) are more important.

It is likely that the original HEA framework would not have been able to pick-up on the key differences between the Rama based on location and livelihood strategies. For the livelihood zone identified by FEWS-NET, each wealth grouping would include both Rama and Mestizos and these would have very different food sharing practices. Even if the framework was used just for the Rama community, a rich farmer in Tik Tik Kaanu and a rich fisherman on Rama Cay would be grouped together, but may follow very different sharing practices that would make them more or less vulnerable to certain threats to their food security.

This section has also shown that Rama sharing practices have changed over time and brings into the question the inflexibility of conceptions of institutions in resilience theory. This shows that having a fine-grained understanding of food security is critical to ensure that actions designed to boost resilience do not risk increasing inequality.

### **8.7: Mestizo encroachment**

This short section of the chapter will outline how the Rama have responded to the Mestizo encroachment in the Rama territory. This is done because this process was identified as an important threat to food security in chapter five and it shows how the original HEA framework's inability to consider multiple overlapping threats is an important limitation.

Theoretically, the Rama have the legal right to evict Mestizos from their territory. The Rama themselves, however, tended to cite more local-level reasons for not being able to assert their right to their land. The most commonly stated reason that the Rama gave for not addressing the Mestizos' illegal behaviour was that the Rama are not a confrontational people. Respondent #4 said it was in the Rama culture to be passive. In reference to the accusation that Mestizos use poison to catch fish, Respondent #19 said:



“Many people here know about these things, but they don't say anything”. This idea that the Costeño population, of which the Rama form a part, are naturally passive when confronted has been noted in the literature (Morris, 2016). This self-generalisation by the Rama is, however, problematic in the face of the more recent actions of the GTR-K in vocally calling for Law 445 to be respected and of some of the self-proclaimed acts of confrontation stated by the respondents. For example, Respondent #32 spoke passionately about the way he spoke in regional meetings, reading out the relevant laws and demanding action.

A few respondents were critical of the Rama leaders and said they could do more to challenge the Mestizos. Respondent #4 said that the leaders have no interest in what the community wants, but are just focused on their own enrichment. Many other Rama I spoke to echoed this sentiment. Respondent #19 even said that Rama leaders had sold Rama land to Mestizos in the past. As noted in the previous section on food sharing (Section 8.6 above), the general impression during fieldwork was that the community of Rama Cay was very divided and there was little co-operation between households. Those I spoke to in Tik Tik Kaanu and Sumu Kaat, by contrast, felt their own community was united, but they didn't have much power to influence the Rama leaders, most of whom resided either on Rama Cay or in Bluefields. As noted in Section 8.1 of this chapter, this fatalism is common where power structures are weak.

These views were not held by all Rama. Respondent #6 was reticent to blame the Rama leadership for not doing enough to expel the Mestizo colonisers, saying many Mestizo had been told they had no right to cultivate the land they were on, but they had met this with resistance. The leaders themselves spoke about how they were largely helpless to control the situation because the true power resides in the capital, Managua. Respondent #7 said there had been some attempts at mediation with Mestizo farmers. She said that some Mestizo had been “very respectful” and recognised the Rama as the true owners of the land as a result, but this was only true for the “viejas de viviendas”—the Mestizos who had lived in the Rama territory for a long time. Most Mestizos had refused invitations to participate in the mediation schemes.

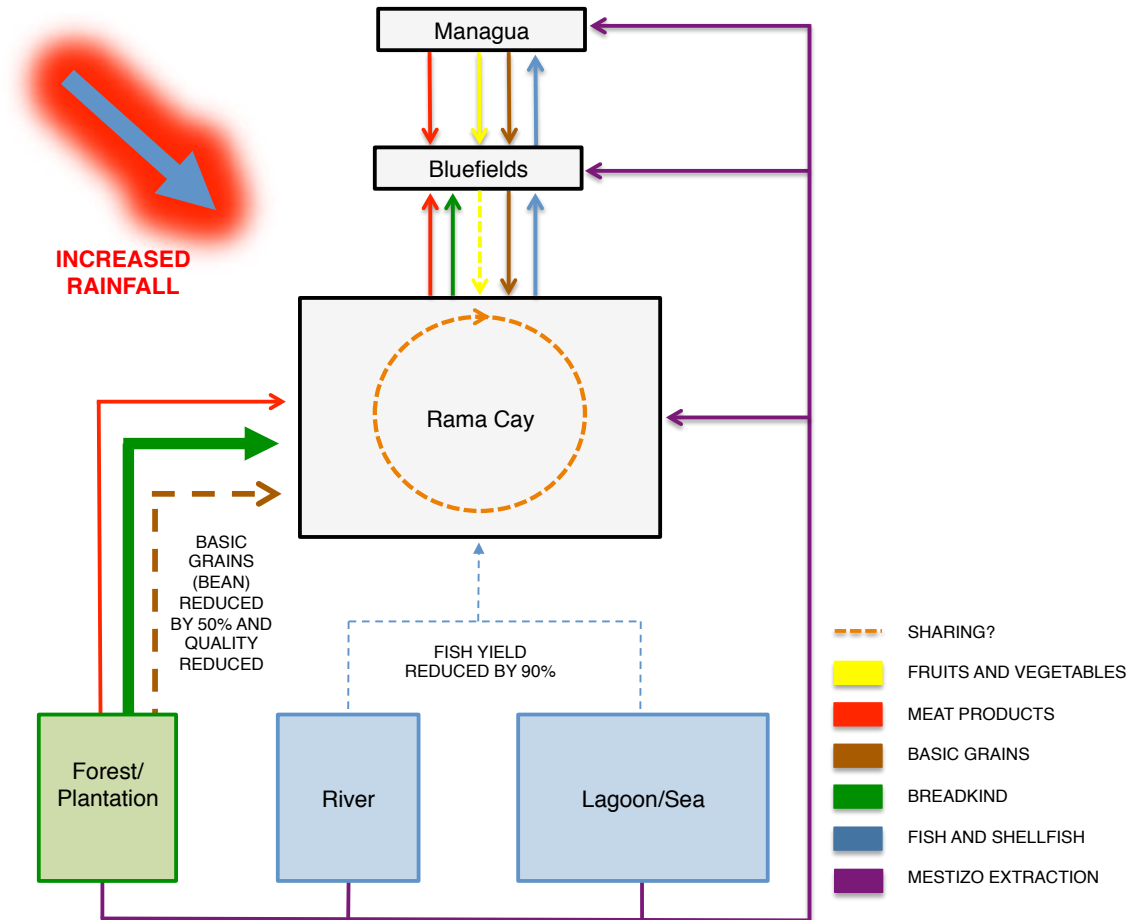
The different attitude towards Mestizos and the actions of the Rama leaders towards their encroachment into the Rama territory, hints at further heterogeneity within the community. This is important to note because it is possible that in times of food

insecurity, the community would not be united about how to address the causes—some may want to focus on responding to weather-based threats and others may be more focused on framing the Mestizo encroachment as the cause. The original HEA framework may not have picked up these differences and this might have hindered characterisations of the Rama’s vulnerability and policy responses.

### **8.8: Impact of adaptation on the foodways of Rama Cay**

At the end of chapter six, two figures were presented (Figure 6.11 and Figure 6.12) showing how the scenarios modelled in that chapter could affect the foodways of the Rama on Rama Cay. As noted, these data were based on the presumption that households would not respond to these scenarios modelled, and/or had not undertaken proactive actions prior to the scenarios occurring. This chapter has outlined the ways in which these households might respond when their food is threatened and, as such, it is now possible to demonstrate how these responses might impact on the foodways of the Rama as outlined in Figures 6.11 and 6.12. This represents the Projected Outcome stage of the HEA. Figure 6.12 is re-produced below as Figure 8.2, showing how the modelled scenarios might affect the foodways of the Rama on Rama Cay if they did not respond to the threat of increased rainfall.

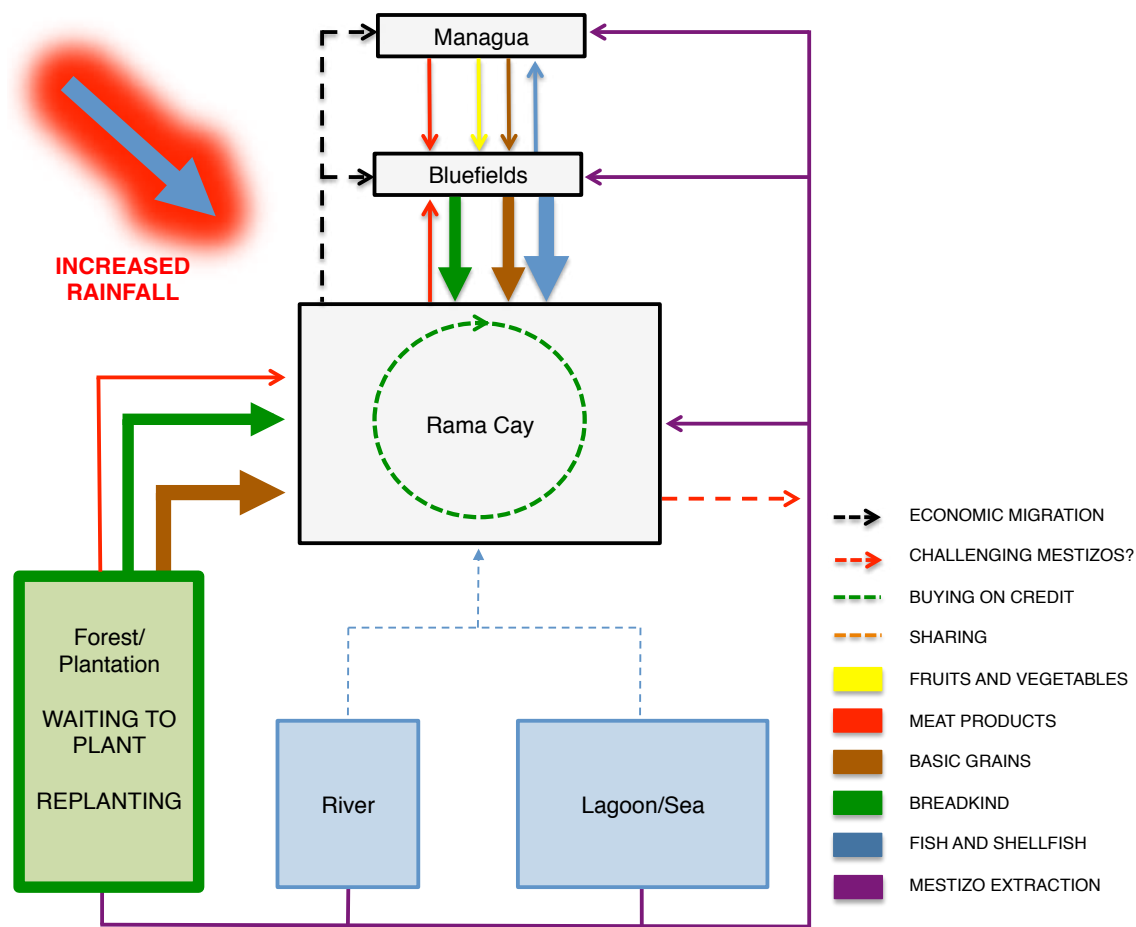
**Figure 8.2: Impact of modelled scenarios on the foodways of Rama Cay**



Source: Author

Figure 8.3 (below) shows the possible impact of the Rama's likely responses to the threat to their food security depicted in Figure 8.2 (above).

**Figure 8.3: Impact of modelled scenarios on the foodways of Rama Cay with adaptation included**



Source: Author

The figure shows that the Rama on Rama Cay may address the shortage of seafood by selling less seafood to, and buying more seafood from Bluefields. They may wait until the rainfall subsides before planting their crops, or replant their damaged crops in order to compensate for the losses to their basic grains and seafood. This chapter has shown that one key response to food insecurity is to buy more food on credit, depicted as being a dashed, circular line within the community. This has replaced the dashed, circular line relating to sharing, as the fieldwork data suggests that the Rama generally reduce or curtail the amount of food they share when facing food insecurity. The figure also depicts the economic migration of some Rama to Bluefields or Western Nicaragua, which can be both a proactive and reactive response to food insecurity, and the more long-term strategy of challenging the resource extraction of the Mestizos.

The figure could be seen as suggesting that the scenarios modelled in chapter six will be unlikely to cause food insecurity. It is important to note, however, that it depicts the

collective experience of the Rama on Rama Cay. As shown throughout this thesis, there is a great deal of heterogeneity within the Rama community. Not all of these responses are available to all of the Rama living on Rama Cay. In some instances, such as buying food on credit, these actions could actually increase their vulnerability to food insecurity, while simultaneously advantaging some other Rama households. While some research has sought to discover adaptations that can be ‘off-the-shelf’ solutions that improve outcomes for an entire community (Pelling, 2011), this research has shown that many adaptations are in conflict one another and can increase inequality because of the heterogeneity of food security experiences at the local level.

### **8.8: Chapter summary**

This chapter has outlined the six responses or adaptations the Rama have undertaken (or attempted to undertake) in the past when their food security has been threatened. These were not adapting (leaving it to fate), buying food on credit, waiting for the right weather, replanting their damaged crops or planting new types of crop, changing or altering their livelihood strategies, and reducing the amount of food or the way they share food with others. It also briefly discussed how some Rama are responding to the Mestizo encroachment into the Rama territory.

The chapter has also highlighted some of the shortcomings of the original HEA framework. Firstly, because of its small sample size, it may have missed how individual households respond to the same threats differently. It may not have picked up on some of the reasons for these differences including differing levels of debt/reliance on credit, constraints on households’ ability to use new knowledge (as highlighted by the brothers who were unable to change their farming practices because of demands on their time), attitudes towards the Mestizos and the importance of how different households’ livelihood strategies afford them different opportunities and constraints in terms of the adaptations they could choose. Secondly, the original HEA framework’s focus on wealth groupings means would mean the diversity that exists between, for example, a rich farmer living in Tik Tik Kaanu and a rich fisherman living on Rama Cay would be obscured, even though they are likely to have very different vulnerabilities and adaptation responses, such as in their attitudes towards the sharing of food.

The first four adaptation strategies highlighted in this chapter – not adapting, buying on credit, waiting, replanting or changing – are only likely to allow households to “survive”<sup>3</sup> into the next season when they face food insecurity. They are unlikely to be able to do anything more than allow the Rama community to “maintain its functional persistence” (Pelling, 2011), and do not address the wider causes of the Rama’s vulnerability. For this reason, they can be classified as resilience adaptations according to Pelling’s (2011) pathways of adaptation. Rickards and Howden (2012) would classify the fourth adaptation action (planting new crop types) as being a transformational adaptation, but Pelling (2011) would classify it as a transitional adaptation because it does not address the root causes of the Rama’s vulnerability.

The final two adaptation actions – changing livelihood strategies and reducing the amount of food that is shared – were more complex. For some households, their chosen livelihood strategies would indeed reduce or remove their vulnerability towards particular threats. These actions, therefore, could be seen as being transformational for those households. For example, for those Rama who now focus on activities like selling food and/or invest their profits instead of sharing their food with others, and those who have moved to a new location to take up a new livelihood strategy (including working on a cruise ship, doing commercial fishing, or another form of waged employment), they are likely to have enjoyed an advantage and will have transformed their vulnerability to food security. These shifts, however, could actually increase the vulnerability of the Rama community overall in the long-term. In the case of taking up commercial fishing, for example, this is contributing towards the problem of over-fishing, which will likely disadvantage most Rama in the longer term (as noted in chapter seven). Equally, an increase in the cash flow or power to some Rama families may make the Rama community more vulnerable because of the resulting increased inequality and/or reliance on just a few families to provide cash loans or goods.

This also shows the constructive tensions that exist within resilience theory more generally. Focusing on resilience in one space, scale or time can cause increased

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<sup>3</sup> To reiterate, the concept of survival here is taken from the Survival Threshold of the Household Economy Analysis. When some families take these adaptation actions, they may already be food insecure. The data collected for this thesis is unable to determine if any of these five adaptations have been effective at allowing families to remain food secure.

vulnerability in other spaces and scales or at other times. Although Pelling's (2011) conception of adaptation does seek to address this criticism, this chapter has also challenged the institutional basis of Pelling's (2011) concept of transformational adaptation. Institutions can be defined as the behaviours, norms and rules of a society (Adger 2000), and the section on sharing (Section 8.6 of this chapter) has shown these can change over time. As argued by Cote and Nightingale (2012), an epistemological shift towards capturing the processes and relations that support institutions is therefore necessary. Finally, the chapter has reasserted that vulnerability and resilience should be considered rough antonyms. The ability of a population (or an individual) to be resilient is bounded up in the same factors that cause them to be vulnerable. All of these points support the view that a fine-grained understanding of a community is necessary to ensure that food security is correctly measured and planned for.





## 9. Conclusion

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This thesis is an investigation into the food security of the Rama indigenous group in Nicaragua. This concluding chapter will recap the contents of the thesis, reiterate the key arguments made in the results chapters, and discuss their practical implications and theoretical contributions. It will also outline future required research.

The conclusion is split into eight sections. The first section will briefly reiterate the focus of the thesis, the gaps in the literature it aimed to fill, and where the data collection was conducted. The second section will describe how the research was conducted, reiterating how the HEA methodology was adapted for the project. The third section of the chapter will summarise the key arguments that the thesis has made, drawing together the findings that were highlighted in the separate results chapters. The fourth section of the chapter will discuss how the findings of the thesis have helped to fill the gaps in the literature highlighted in chapter two. The fifth section of the chapter will discuss the practical implications of the findings and the sixth section will discuss their theoretical implications. The seventh section of the chapter will outline the areas where more research still needs to be conducted and the final section will briefly summarise the contribution of the thesis.

### **9.1: Aim of the thesis**

This PhD has addressed four gaps that currently exist in food security research. Firstly, there is a paucity of research on the access and utilisation elements of food security. Secondly, a better understanding is needed of how potential drivers and mediating factors interact to determine food security in small communities. Thirdly, there is no ‘gold standard’ measure of food security. Fourthly, there is a paucity of research on the stratification of food security resilience within small communities, suggesting a greater theoretical engagement with resilience at the household level is needed.

In order to do this, the thesis focused on a case study of the Rama indigenous group who live on the Caribbean Coast of Nicaragua. Nicaragua was chosen because of the significant social, economic and environmental pressures acting on its food security and the inequality that exists both between and within its different regions.

## **9.2: The adaptation of the original HEA framework**

The thesis used an adaptation of an Emergency Food Security Assessment (EFSA) called the Household Economy Analysis (HEA). The limitations of the original HEA framework were outlined in the methodology chapter of the thesis (chapter three). Firstly, its analysis of large regions relies on a small sample size. This makes it liable to restrict the understanding of the heterogeneity of populations like the Rama and the contribution of this difference to food security risk, and it could miss entire populations, particularly in ethnically diverse regions. Secondly, the original HEA framework relies on wealth groupings to separate populations within livelihood zones. This means that other, more individual-level distinctions – such as livelihoods, culture, trust, individual attitudes, relationships and knowledge – may be overlooked. Thirdly, its reliance on assessing risk through calories means that the access and utilisation elements of food security may be obscured because it is unable to measure, and consider the importance of, the quality of the calories and personal preferences. It may also mean that how risk factors interact and modify each other to influence food security may be missed. Finally, the HEA is based on hypothetical responses to stresses, limiting its utility to real situations other than for its intended purpose of assessing the need for food aid.

To mitigate some of these disadvantages, the HEA was adapted for this thesis. The sample size was increased (to 110 households) and this research relied more heavily on qualitative evidence – in the form of in-depth interviews – to be able to better understand the access and utilisation elements of the Rama's food security. 'Real' food data were collected using dietary surveys in order to reduce the impact of the limitations of the household surveys. The project also focused on past adaptations undertaken by the Rama so 'real' – as opposed to modelled – scenarios were assessed. These changes to the methodology allowed the thesis to answer questions about the current food security challenges for the Rama, to determine the different reasons for differing levels of vulnerability, and to explore past responses to threats to the Rama's food security.

## **9.3: Findings**

This section of the chapter will outline the key findings of the thesis and is organised into five sub-sections. The first sub-section will summarise the findings of the thesis in

respect to the food security status of the Rama and the social variables and factors that affect it. The second sub-section will reiterate the threats to the Rama's food security as outlined in chapter five and comment on which can be considered the greatest of these threats. The third sub-section will summarise the adaptation strategies that the Rama use to boost their food security resilience. The fourth sub-section draws together all of these findings into Figure 9.1, which depicts the Rama's food system from a food security perspective. The final sub-section will discuss the heterogeneity of individual household's food security experiences and stress the importance of taking a holistic approach to food security research.

### *9.3.1: Food Security*

The data collected suggest the Rama were food secure during the fieldwork, but that they are vulnerable to transient food insecurity. In chapter six, extreme weather scenarios identified by the Rama (in chapter five) were modelled onto the dietary baselines of four families. This showed that the selected households would be unable to meet their basic needs in these scenarios. This did not take into account the way in which these scenarios are likely to affect the families on the ground, however; the scenarios would also be bound up in the proactive and reactive responses of the households. Although chapter eight outlined these responses and demonstrated how they might impact on the Rama's foodways, there is a great deal of heterogeneity in the Rama's responses—some Rama choose not to adapt when threatened by food insecurity or may undertake adaptations that could cause long-term harm. As a result, the threats highlighted in chapter five could be very significant for the community's food security.

The thesis showed that there are numerous social variables and factors that shape food security outcomes of the Rama. These include the education level of the individual, their endowments (including their skill set), their income and level of wealth and/or debt, their ability to carry out tasks relating to their foodways (often determined by the amount of time they have available or their health status), where they live and their chosen livelihood strategy(ies) (and the social and business connections derived from these), their view of the Rama's food traditions, and their personal tastes.

These findings reinforce the view that the FED (Food Entitlements Decline) conception of food security has better explanatory power than the FAD (Food Availability Decline) conception of food security. The thesis has shown that multiple factors can have an impact on the endowments, and subsequently the entitlements, of individual households regardless of the overall availability of food in the region (Osmani, 1993). Maxwell and Frankenberger (1992) outlined a number of threats to food security at the market and state level – such as restrictions on labour migration, taxes, and inflation – that were not discussed in this thesis. This is likely because this research was focused on the local level. By focusing at this level, however, the thesis has been able to demonstrate there is significant heterogeneity in the causes of food security for each individual household. To say that food security is caused by poverty, as per Smith, Obeid and Jenson (2000), is less accurate than saying it is caused by an interaction of multiple factors, some of which are related to poverty. This idea of interacting factors will be returned to in the following sub-section of this chapter.

The following sub-section will summarise the threats to food security (highlighted in chapter five) that exist in concert with the social variables and factors outlined above. It will make a judgement about which of these is the greatest threat.

### *9.3.2: Threats*

Chapter five showed that most Rama consider the weather and/or climate shocks to be the greatest threat to their food security. The chapter was separated into climate-related threats and non-climate related threats, and the climate-related threats were separated into direct and indirect threats.

The direct, climate-related threats included climate shocks (notably Hurricane Juana, 1988) and the direct impact of climate variability on crop yields and quality. The indirect, climate-related threats included the way that the wind velocity and amount of precipitation can affect seafood yields and the Rama's ability to acquire fish, the quantity and quality of the crops they produce, and market prices and the extent of pest infestations. The Rama noted that in recent years there has been increased variability in both the amount of rain and when it arrives each wet season. Climate change is likely to affect the extent of weather variability and the number and severity of the climate

shocks that the Rama will experience (Karfakis *et al.*, 2011; Maslin, 2013). As a result, it is likely that climate change is having, and will have a significant impact on the Rama's food security.

The non climate-related threats were entirely indirect. They included the encroachment of the Mestizo into the Rama territory, ineffectual resource use including overfishing, and fluctuations in individual income. The Mestizo encroachment into the Rama territory is arguably the most significant threat other than the weather. It has added pressure onto the Rama's natural resources (notably fish stocks, and farmland for growing crops and cattle raising), by both increasing the number of people exploiting them and through the techniques they use. The Rama accuse the Mestizo of using fine-mesh gill nets, poison and dynamite in the region's water courses, of using 'slash-and-burn' agriculture, and of cutting down trees to provide land for cattle grazing. According to international and domestic law, the Mestizos do not have the right to exploit the natural resources of the Rama territory in this way.

As noted in the previous section, the thesis highlighted the way that multiple factors interact to determine food security, either through the direct impingement on foodways or through the mitigation of the relationship between the weather and the Rama's food and the other threats that they highlighted. A useful example of this was shown in the discussion of the impact of Hurricane Juana (Joan) in 1988 on the Rama's food. Many Rama believe the hurricane had a significant effect on the short- and long-term abundance of resources in the Rama territory. It is likely, however, that there was a more nuanced interaction of multiple factors with the hurricane, the encroachment of the Mestizo into the Rama territory, the loss of hunting expertise and shifting dietary tastes all contributing. This shows that research that reduces food security to being dependent on just one factor ignores the way in which food insecurity is constructed on the ground.

Having said this, the thesis does suggest that climate shocks have more potential than the other highlighted threats to disrupt the entire food security system. In a very short period of time, Hurricane Juana in 1998 destroyed or disrupted the majority of the Rama's natural resources, displaced almost the entire Rama population and severely restricted their ability to earn money. These findings are consistent with the literature

that suggests climate shocks can affect food security through the way they expose market, societal and governance weaknesses (Schmidhuber and Tubiello, 2007).

The distinction between direct and indirect threats to the Rama's food is important in this case because direct threats tend to receive more attention from policymakers. For example, Hurricane Juana had an enormous impact on the food security of the Rama, making many of them almost entirely dependent on aid for their survival. The Nicaraguan government and foreign donors were aware beforehand that the hurricane was likely to have a large impact on the populations of the Caribbean Coast<sup>1</sup>, however, and therefore were able to provide the aid they required before the hurricane made landfall and throughout the subsequent recovery period. In contrast, the often-slow onset and/or less visible effects of indirect threats mean policymakers sometimes ignore them. As explained by Finley-Brook (2016) and Morris (2016), indigenous land rights in Nicaragua are not effectively protected by the national government nor receive any international attention, yet this thesis has shown the encroachment of the Mestizo into the Rama territory is having a significant impact on their food security.

What is not highlighted by work on the causes of, and threats to food security is that the impacts of threats are significantly influenced by the way that community responds. The way the Rama respond to threats will be outlined in the following sub-section.

### *9.3.3: Adaptation*

Chapter eight described the different ways that the Rama respond to food insecurity, or possible future food insecurity. These included choosing not to adapt, buying food on credit, waiting for the right time to plant their crops, or replanting their crops, changing livelihood strategies, sharing less food, and challenging the Mestizo's use of Rama resources.

As argued in chapters six and eight, however, there is not a linear relationship between discrete threats and discrete adaptation actions. Adaptation is both proactive and reactive (Stakhiv, 1993; Adger and Kelly; 1999; Smit *et al.*, 1999), and households are often adapting to multiple threats at the same time (Corbett, 1988; Hendriks, 2015). As

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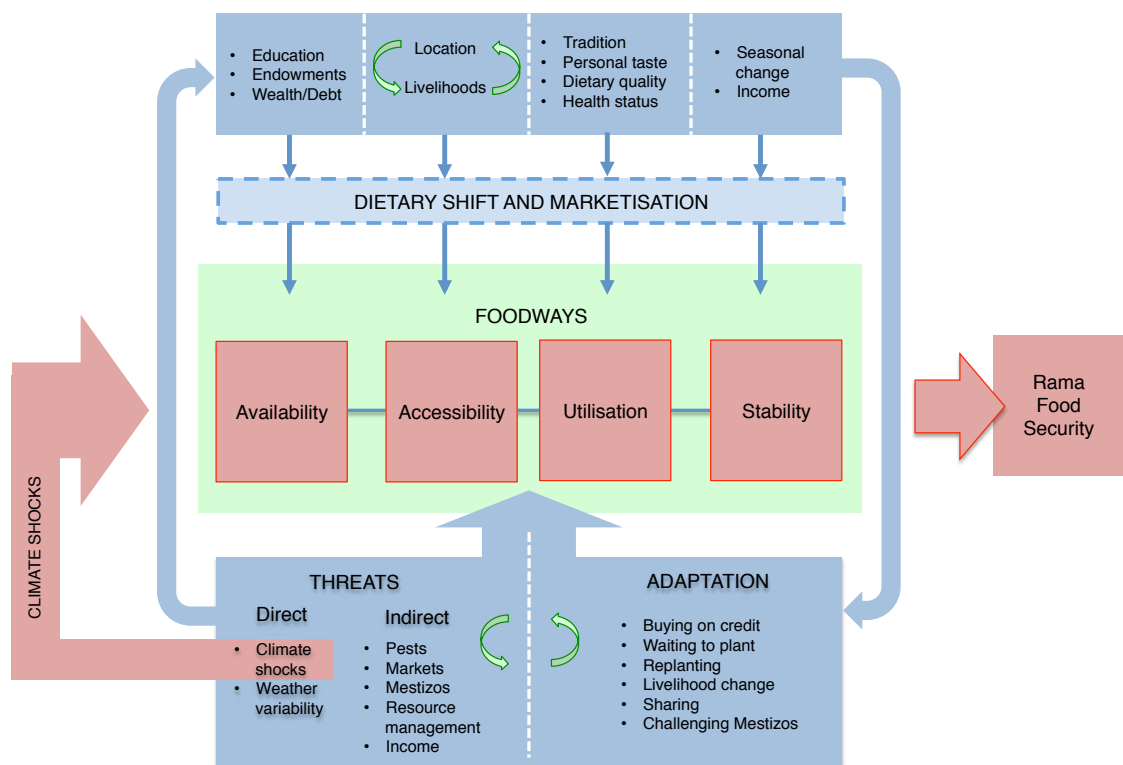
<sup>1</sup> President Ortega visited the Caribbean Coast in the period before the Hurricane made landfall

a result, the way threats and adaptation actions interact with one another and the influence they can have on food security are reliant on the social variables and factors that were outlined in sub-section 9.3.1 (above). For example, the threats to the Rama's food security can erode income, endowments, time and wealth, and increase debt or reduce dietary quality and health. Equally, the ability of a Rama household to resort to certain adaptation actions is also restricted by these social variables and factors. For example, their ability to exploit credit relationships is reliant on their income and/or wealth, and their ability to replant their crops is dependent on their endowments, including access to land. As a result, depicting the food system of the Rama based on the findings of this thesis is best achieved with a diagram, and this will be presented in the following sub-section.

#### 9.3.4: Summary of findings

This section of the chapter has outlined some of the key findings of the thesis. These are condensed in to Figure 9.1 (below).

**Figure 9.1: The factors that shape the food security outcomes of the Rama**



Source: Author

The social variables and factors that shape the food security outcomes of the Rama are included in the upper, blue box in Figure 9.1 (above). These influence the foodways of the Rama and the four dimensions of their food security: availability, accessibility, utilisation and stability. Their impact is likely to change over time as a result of dietary shifts and increased marketisation.

The social variables and factors are positioned above the food security dimension they influence the most, but the white dashed lines between them show they can only be loosely divided in this way as they can and do influence each other. For example, an individual's education can affect both the accessibility and availability dimensions of food security through its influence on an individual's chosen livelihood strategy. Equally, wealth is an important driver of the amount of time that Rama individuals spend in Bluefields and there is a suggestion based on the data in this thesis that this could alter their dietary preferences through increasing their exposure to Western food.

Location and livelihoods are depicted as influencing one another as explained by Figure 8.1 in chapter eight. Threats and adaptation are shown in a feedback loop in order to capture the way in which they do not operate in a temporally linear manner as noted in sub-section 9.3.3 (above). In turn, both of these also interact directly with social variables and factors independently of their impact on Rama foodways. For example, buying food on credit could erode income, and a climate shock could damage household endowments such as boat motors. The large blue arrows connecting both the upper and lower boxes in Figure 9.1 represent this feedback loop. Climate shocks are included in the list of direct threats, but are also drawn out into a larger red arrow to show the way that they can disrupt the entire food security system in the way that Hurricane Juana did in 1988.

A criticism of this diagram is that because it seeks to depict the food system of the entire Rama community, it simplifies the differences between households. One of the key findings of the thesis is that there is extensive heterogeneity within the Rama community and the following section will discuss its importance.



### *9.3.5: Heterogeneity*

All of the results chapters revealed the heterogeneity that exists within Rama society in relation to food security. The differences highlighted exist both within and between the three communities studied. This section is organised by the stages of the original HEA framework.

#### *9.3.5.1: Foodways*

Chapter four highlighted three major differences. Firstly, the amount eaten of certain types of food is very different between the three communities, with the consumption of dairy products, beans and oysters of particular note. This means the vulnerability of the different communities will be stratified by season as the weather and other factors have a greater effect on certain food items at different times of the year.

Secondly, there was a difference in the amount of food that was bought as a percentage of the total food sourced. Generally speaking, those households who live on Rama Cay buy the majority of their food, whereas those households who live in Tik Tik Kaanu or Sumu Kaat tend to source the majority of their food from their own production. There is also considerable variability within each community. This means that fluctuations in market prices and in production yields will affect households differently and their vulnerability to the same event is likely to be very different.

Thirdly, each household follows a different mixture of livelihood strategies, relying and drawing upon different resources. This is most clearly seen with the distinction between those who rely more on traditional livelihood strategies and those who rely more on non-traditional livelihood strategies, but also in the division between those who predominantly fish and those who predominantly farm. Chapter four explored the reasons why individuals have pursued certain livelihood strategies and this highlighted the varied access that households have to natural resources, markets and jobs.

On Rama Cay, some residents have their own motorboats, whereas others have to pay a “pass”, or rent a sailing dory if they want to travel to Bluefields or other locations. This results in a significant variation in both the vulnerability and resilience of individual

Rama households on the island—the former because they rely on different resources for their food security and the latter because they have access to different resources that are vital when their food security is threatened. It is important to note that this stratification may not necessarily be caused by personal wealth, but may also be due to personal endowments and attitudes (the utilisation dimension of food security), as well as external forces. For example, chapter four showed that households have different attitudes towards food items such as pork and oysters. If households privilege certain food items over others, this could cause a stratification of risk in the face of threats that affect one type of food over another. These findings highlight the importance of considering all the dimensions of food security as the availability dimension alone cannot account for the differences outlined here.

At an even more fine-grained level, families are likely to make different decisions about how they split the time and skills of each individual member (Morsello, 2002). At this scale, factors such as gender inequality will become even more important and it is likely that marketisation and dietary change will exacerbate these differences (Counihan and Kaplan, 1998; Lewis, 2005; Lu, 2007).

#### *9.3.5.2: Threats and impact*

While chapter five showed that most Rama considered the weather to be the biggest threat to their food security, chapter seven showed there were differences in the costs and benefits of specific weather conditions. Rama households do not have a uniform perception of what is good weather because of the way ownership of certain types of equipment affects their ability to fish. More wealthy individuals are able to purchase motorboats and gill nets and this means they are better able to catch fish in windy conditions than those who do not own these endowments. This means that not only is there a difference in the perception of certain weather conditions between those who own boat motors and gill nets, and those who do not, but the weather conditions might also contribute to the poverty cycle in which some Rama households find themselves. The richer families who can afford motorboats and gill nets are not only more able to catch fish than the poorer Rama in the short term, but they are also contributing to the longer-term decline in fishing stocks and this is likely to hit the poorest Rama the hardest as they are generally more reliant on this calorie and income source.

This is important because it means that some households will be affected by the same threat in different ways according to how they perceive that threat. It is important that policymakers are aware that each Rama household could have a different opinion about what is the most important threat to their food security. Failure to do so could contribute towards creating or exacerbating inequalities within the community.

Although Figure 9.1 (above) suggests that climate shocks might exist as an external threat to the Rama's food system, this is not the implication. Firstly, climate shocks exist in a feedback loop with responses to threats and also influence the social variables and factors that influence food security. Secondly, this section of chapter on heterogeneity shows that the extent of vulnerability is stratified within small communities. This supports the social vulnerability model that posits that vulnerability exists within the human system itself (Brooks, 2003; Houghton *et al.*, 2001), and allows for the possibility to address the impact of these threats through adaptation actions. The following sub-section shows how there is also heterogeneity in these responses.

#### *9.3.5.3: Adaptation*

Chapter eight showed that how Rama households respond to threats to their food security is also likely to be heterogeneous. Some of the reasons for this difference include a variation between households' debt levels, and/or the different livelihoods they pursue, their knowledge and constraints on its use, different levels of trust and relationships between neighbours, leaders and within the family, and the availability of, and access to education, skills, and by extension, jobs.

Because of this, it is likely that any adaptation action taken could actually increase inequality and create new vulnerabilities across time, space and scales (Carpenter *et al.*, 2001). For example, although those families that took more drastic actions in the face of perturbations – such as changing their livelihood strategy and reducing the amount of food they shared – were arguably making individual transformational adaptations, their actions could increase inequality in the community as a whole. Equally, if all Rama were to switch to using gill nets, their resilience to weather variance would be increased, but fishing stocks would likely collapse and thus affect future resilience.

Tendall *et al.* (2015) define food resilience as being the capacity of the food system to provide sufficient, appropriate and accessible food *to all at all times*. In the face of the data presented in this thesis, it is difficult to see how any action aimed at increasing resilience would be able to avoid increasing inequality and thus reducing the relative resilience of some individuals. Research by Eriksen and Lind (2009) showed that those who already possess power, wealth and influence are best positioned to take advantage of the opportunities presented by change. The comment by Respondent #19 in chapter five that the jobs only went to the ‘special people’, and Respondent #31 admitting he was in a better economic situation than most other Rama, hint at this possibility in the Rama community.

This is a problem with resilience theory more generally: it privileges the maintenance of certain trajectories and relationships regardless of whether or not they are favourable to every individual on the assumption that there is a desired state to pursue (Phelan, Henderson-Sellers and Taplin, 2013; Brown, 2014). As a result, the type of heterogeneity highlighted by this thesis is ignored.

Pelling’s (2011) conception of transformational adaptation, based in resilience theory, is of actions that seek to challenge the initial causes of the population’s vulnerability. Of the adaptation actions identified in chapter eight, none of them could be considered adaptations that would address the general vulnerability of all (or even most) of the Rama in the communities studied. Moreover, there are dangers associated with attempts to challenge vulnerability. In April 2018, there were a number of protests in Nicaragua, both in the Pacific and Caribbean regions, demanding that the government’s reforms to social security be halted. The protests ended in violence. There is evidence that more than 400 people have been killed and there are unsubstantiated reports of extra-judicial killings and political imprisonment without trial. These protests could be characterised as an attempt to challenge the vulnerability of poor Nicaraguans, but they have resulted in the weakening of institutions and markets and a shift in focus towards addressing the fallout of the protests and away from the needs of groups such as the Rama.

If attempts to enact change result in the most vulnerable people losing out, as has been seen in Nicaragua, it is important to develop an alternative framework of adaptation. This will be best achieved through holistic, local-level research.

#### *9.3.5.4: Holistic approach to food security*

As demonstrated by the complexity of the Rama's food system outlined in Figure 9.1 (that still does not adequately demonstrate the heterogeneity that exists within the Rama community) local-level research is critical to be able to understand food security. The findings of the thesis have further reiterated that the access and utilisation elements of food security need to be considered more extensively in food security research. This is particularly important when the stratification of food security vulnerability amongst the Rama is considered: many of the differences highlighted were due to variations in physical access to resources and knowledge, or as a result of cultural or personal preferences. Many food security measures, particularly those based on calories and anthropometric measurements, are unable to consider these elements. Equally, coping-based food security measures may have been unable to pick-up on certain household-level differences amongst the Rama that were highlighted, notably the variation in debt levels resulting from buying food on credit, or the ability to pursue certain livelihood strategies.

The adaptation of the original HEA framework used for this thesis has been a useful methodology to highlight household-level issues, achieved by its larger sample size, longer period spent in the community and through conducting in-depth interviews. It has been less effective at understanding the wider political and economic vulnerabilities of the region and how these influence other communities. The additional resources required for the larger sample size and the in-depth interviews also meant some of the data were less extensively verified than they would have been had the original HEA framework been used instead. This may be the reason why, according to the household survey data, the majority of the Rama households appeared to be eating less food than their daily calorie requirements.

The adaptation of the original HEA framework was critical to developing many of the findings of this thesis. For example, the three Rama communities studied were very different to one another in terms of their access to jobs, markets and natural resources. It is likely the original HEA framework would have placed the Rama into the same wealth grouping (the method of differentiation used by the original framework), despite the fact that the Rama have very different levels of vulnerability and resilience due to a number of factors. Even if the original HEA framework did highlight some of the differences

between the Rama households and communities, it would be unlikely to be able to explain the reasons behind them and their significance. In fact, it is possible that no Rama families would be represented in the assessment because only 6-10 families from the entire Caribbean Coast region would have been included.

This section of the chapter has demonstrated the importance of understanding the heterogeneity that exists within small communities such as the Rama. It has shown that in order to fully understand food security, it is necessary to take a holistic, systems-approach to research. The following section of this chapter will show how the findings presented here have filled the gaps in the literature that were highlighted in chapter one.

#### **9.4: The gaps in the literature**

The thesis highlighted four areas where additional research was required. Firstly, more research is needed into the access, utilisation and stability elements of food security. Secondly, there is no 'gold standard' food security indicators or assessment methodology in existence. Thirdly, there is a paucity of research on how the concepts of vulnerability and resilience play out on the ground in relation to food security. Lastly, studies on food security typically focus on the global or national scales, meaning that the factors that drive and mediate food security at the local level are usually missed. This section of the chapter will explain how this thesis has contributed towards addressing these gaps in the literature.

The thesis showed importance of the accessibility and utilisation dimensions of food security. For example, Rama households have different levels of access to, and attitudes towards oysters and this could cause a stratification of food security risk if their quality or quantity was threatened. The stability element of food security was less straightforward to assess without a more extended period of fieldwork, but the data from the interviews suggested that seasonal changes and market fluctuations can have a big affect on some households' food security directly and also erode cash reserves, endowments and other resources for the future. For example, during certain weather conditions fishermen who do not have gill nets and/or boat motors are less able to catch fish than those who do, and are more likely to buy food on credit, potentially eroding their future income.

In terms of the measurement of food security, it was not anticipated that this thesis would provide a new unequivocal, 'gold standard' measure of food security. By using an adaptation of the original HEA framework, however, it has revealed two important shortcomings in the way food security is currently measured. Firstly, by being able to give greater consideration to the utilisation dimension of food security, it has revealed the limitations of measures that only consider the availability and accessibility dimensions. Secondly, by detailing the heterogeneity of food security experiences within the Rama community, it has demonstrated that research focused on the regional, national or global scale risks obscuring the food security challenges that many individuals face.

In relation to the vulnerability and resilience literature, the findings have shown that, because of the heterogeneity that exists in the Rama community, resilience is too inflexible a concept at a fine-grained level, reinforcing one of the criticisms of resilience theory made in the literature. New frameworks that are able to account for variation in resilience at different scales, spaces and times are needed. This will be discussed further in Section 9.6 of this chapter (below).

The area where the thesis has made the largest contribution is in its attempts to rebalance the assessment of food security more towards the local scale, as opposed to the regional, national or international scales. By conducting a fine-grained analysis of the food security of the Rama, it has shown that there are critical processes that occur at the local level that can affect the food security of an individual, and that these will not be picked-up on by analyses at different scales.

There is a presumption within a great deal of climate change adaptation research that suggests that if certain practices are followed everyone will benefit (Pelling, 2011). This research has shown that policies and approaches to alleviate food insecurity can be in conflict with one another and can reinforce inequality. This, therefore, reinforces the views of adaptation advocated by Pelling (2011) and Taylor (2015) that policies need to address the root causes of social vulnerability. As mentioned in Section 9.4 of this chapter, however, it is unclear how this can be enacted on the ground.

This section has outlined how this thesis has contributed towards the gaps in the literature that were highlighted at the start of the thesis. The following section of the chapter will set out the practical implications of these contributions.

### **9.5: Practical implications**

The number of families within the Rama community that may be food secure only because of their use of unsustainable coping strategies suggests that action is needed. Moreover, because current measures of food security tend to underplay the access, utilisation and stability elements of food security, it is likely that food insecurity globally is being underestimated. Families who suffer from transient food insecurity or who are using unsustainable coping strategies to alleviate the effects of a cultural limitation on their food are erroneously considered to be food secure.

The thesis has shown that some discrete future threats (such as land pressures and climate change) are likely to have a significant impact on the Rama's food security, but it has also highlighted that food security is constructed by multiple factors that are affected by multiple mediating influences. Research therefore needs to take a systems-based approach to understanding food security with research findings placed within their wider context rather than deterministic, single factor-based approaches based on one threat.

The thesis has also shown that there is significant heterogeneity within the Rama community in relation to foodways, levels of vulnerability and levels of resilience. Policymakers and stakeholders need to be aware that vulnerability will be stratified by season, fluctuations in market prices and weather conditions, and be dependent on what resources are affected and how different households respond. For example, because individuals pursue different livelihood strategies, if a climate shock were to affect a particular food resource, this would have a greater impact on those individuals who are more reliant on this resource than those who are less reliant on the resource.

Policymakers and stakeholders – both with the Rama and in other settings – also need to have an understanding of all the determinants of food security in particular contexts, how these affect vulnerability at the household level and how food security policies will



further influence household-level inequality. It is likely that national- and regional-level adaptation policies aimed at addressing general vulnerability will benefit one group of people, but not others. Understanding this will enable a better short-term response to transient food security and better long-term planning of interventions to reduce vulnerability. When conducting adaptation initiatives, extensive research in every community may be impractical, but implementers should at least aim to understand the key factors likely to influence the access, utilisation and stability elements of food security, in order to avoid significantly disadvantaging particular individuals within a community.

The thesis showed that both vulnerability and resilience are influenced by households' perception of risk and cultural differences as well as decisions about, and constraints upon livelihood strategies. These are often linked to factors including the educational status of individuals, the resources and skills they possess, their wealth, their cultural values and where they live. For example, one household felt unable to change the way they planted their crops because of the amount of time they were able to dedicate to each of their livelihood strategies. Some households may choose not to take any action if they want to preserve endowments or do not view something as a threat. Some households may not move to other areas to take up opportunities because of their connection to their land. Chapter eight showed that food-sharing practices in Rama society have changed over time. This shows that it is important that programmes are evaluated with an awareness of past actions and/or potential future changes that may affect what options are available to a community when food security is threatened.

Climate change will be an important determinant of future food security for the Rama, but addressing global greenhouse gas emissions are largely beyond the scope of the Rama community. Instead, its focus should be on securing a national-level solution for the encroachment of the Mestizo onto Rama land. This will be further framed by the whether the community can achieve an effective balance between increasing opportunities for wage work and protecting its natural resources. The implications for food security of these changes are likely to be profound because of their impact on the Rama's diet and access to food.

## 9.6: Theoretical implications

This thesis has shown that food security is an extraordinarily complicated concept. This complexity goes some way to explaining why much research on food security is reductionist—it is very difficult to effectively encapsulate all its dimensions, and potential causes and modifiers in one study. This suggests that food security can only ever be fully understood at the local level, as with larger-scale studies it is very likely that some of the complexity is missed due to time and resource restraints. This reinforces the importance of the fine-grained nature of the research in this thesis.

At the global scale, it is no surprise that the utilisation dimension of food security is frequently sidelined, but this thesis has shown how important it is. Chapter five showed that food threats, such as the weather, can affect the quality of food as well as the quantity. Chapter six showed the problem of only tracking one threat to food security when there are so many potential causes and modifiers. Chapter seven showed it is important to have a careful appreciation of the different ways people talk about and see the impacts of weather on their livelihoods, particularly given the threat that climate change poses to food security. Evidently then, utilisation is critical to food security—even when there is available and accessible food for a population, it is possible that some individuals will still go hungry, or be disadvantaged in a way that affects their future food security.

The sort of complexity presented in this thesis is a challenge to the current conception of food security, which draws in so many factors that it is arguably unmanageable. It is, however, important not to fracture the academic field too much by rejecting the current view of food security entirely and moving too quickly towards other concepts (Clapp 2014; Westengen and Banik, 2016). Despite this, new frames of reference will need to be developed to cope with this complexity. The ‘intellectual neighbours’ of food security, such as food sovereignty and food resilience (both of which have been touched on in this thesis), present an opportunity to extend and reframe food security at the local level. For the former, focusing on how to mediate resource conflict will be critical, as seen with the encroachment of the Mestizos highlighted in this thesis.

For the latter, this thesis has shown that present interpretations of resilience theory are too conservative for studies of food security at a fine-grained level. It has shown that

there is an extensive variation in resilience at different scales, spaces and times. What is required within food resilience, therefore, is the flexibility to understand the messiness of human systems.

The thesis showed that evaluations of the effectiveness of adaptation depend on the scale at which they are assessed. An adaptation undertaken by one household (or individual) such as buying a gill net can be an effective pre-emptive adaptation for that household, but may disadvantage other households by contributing towards overfishing.

The empirical data also shows that the vulnerability of Rama households is often dictated by their access to natural resources, markets and jobs. These geographies of access are a significant determinant of the noted heterogeneity in household-level resilience. Equally, the same choices are not available to every household, even when knowledge about the benefits of certain courses of action is widespread. An example of this is the two farmers described in chapter eight who knew that planting their crop in straight lines was the most effective technique, but were too busy to put it into action.

Furthermore, the impact of threats to food security and the adaptation to those threats do not occur in a linear way. Instead, both occur concurrently with the adaptations used often being responses to non-bounded events and some of these responses subsequently becoming part of an individual household's livelihood strategy. This shows that resilience and vulnerability cannot be separated on the ground and that vulnerability and resilience should be viewed as rough antonyms—for the Rama, the decision to adapt in a certain way (or indeed not to adapt) has been shown in this thesis to be bound up in the same factors that govern their vulnerability. For example, those Rama who own a gill net and a motorboat are less affected than other fishermen by certain weather conditions and also have greater endowments to sell should they need to. This suggests that disciplines that have embraced this normative view of resilience may prove useful.

Human geography, therefore, presents a suitable framework for considering the spatial and scale-based determinants of resilience because it is more able to account for social memory, social learning and individual agency (Wilson, 2018). It is well placed to critique the way resilience theory reinforces neoliberalism with its focus on how individuals adapt rather than the structural causes of their vulnerability. The Rama community shows this emphasis on individuals is clearly unhelpful: the way in which

the Rama's food security is affected by the weather and the Mestizo encroachment onto their land (and the heterogeneity within and between the communities) cannot be entirely explained by how individuals respond to threats to their food security. Chapters seven and eight in particular showed that an understanding is needed of both structural causes and individual differences. The motivations and decisions made are individual, but they are bounded within existing power structures. This is also shown by the tension that the Rama face when choosing between farming and/or maintaining land, and pursuing education and/or wage work.

Further research based within a holistic, geographically specific understanding of food security can improve resilience theory. The following section will outline areas that would benefit from additional research.

### **9.7: Future research**

There is a need for additional research to expand on the findings of this thesis. One key area of focus will be to expand the empirical scope of the research specifically on the Rama community. On this basis, research into the other Rama communities not assessed in this thesis is important, as it is likely to unearth further issues that need to be considered. In particular, more in-depth research is required into the market integration of the Rama, the issues around resource depletion in the Rama territory as a result of over-fishing and land degradation/trafficking, and water security. Quantitative information should be collected, but anthropological and other qualitative research is critical to help understand the drivers of these challenges and their longer-term social impact. Household perception, or experience of food insecurity, indicators such as the Food Insecurity Experience Scale (FIES) might be a useful starting point for collecting this sort of information (Smith, Rabbitt and Coleman-Jensen, 2017). Further research into seasonal differences would also be invaluable as this was a limitation of both the original HEA framework and the adaptation used for this thesis. Longer-term research focused on collecting year-round data would also provide valuable data on the impact of market forces including food prices. There would also be significant benefit from more research into food sharing practices with the Rama as a contribution towards a greater understanding of how non-food is shared, how shared food is reciprocated and crucially the influence of increased market integration. Future research on how the nutrition

transition is being experienced within the Rama communities – with a particular focus on the consumption of snack food – would be beneficial for understanding change over time and would help to inform future research and modelling.

In terms of the whole of Nicaragua, a greater understanding is needed of the food security status and challenges of other indigenous groups. This is most notable in the Bosawás Biosphere Reserve where little research on general food security has been conducted. As was noted in the introduction to this thesis, even during a complete assessment of Nicaragua conducted by FEWS-NET, data was not collected in the Reserve. Both aggregate data and fine-grained studies such as this thesis would be greatly beneficial in all Nicaraguan regions, but particularly on the rest of the Caribbean Coast as this thesis has revealed that populations within the region cannot be considered to all face the same food security challenges. This is especially pressing given the extent of societal change that is in evidence in this region.

Future research would benefit from frameworks that are able to encapsulate the temporal and spatial variation in both micro-scale forces, such as livelihood strategies, credit arrangements and variation in household resources, and macro-scale challenges such as climate change, biodiversity loss and global price changes. As mentioned in the previous section of this chapter, human geography as a discipline could be well placed to provide these frameworks. An updated HEA framework designed to include more families for assessment and with a focus on collecting data determining the differentiation between families other than wealth groupings would be invaluable, provided sufficient time and resources were available to collect quality quantitative data. Future research should aim to address the weaknesses of the adaptation of the HEA used in this thesis and apply it to other communities with different challenges in different contexts. This would allow for a further exploration of the best ways to measure food security in different conditions and the eventual development of a ‘gold standard’ measurement of food security.

## **9.8: Summary**

This thesis has addressed four main weakness identified in the current food security research literature. By adapting the original HEA framework in order to mitigate its

limitations and by studying three distinct communities of the Rama indigenous group, it is possible to understand the different threats their food security is facing.

The thesis found it is likely that some Rama households are subject to transient food insecurity, that multiple factors interact to determine their food security status, and that the weather and the Mestizo encroachment onto their land were the biggest threats to their food. It found there was significant heterogeneity within and between the three communities studied. This included differences in the amount of certain types of food being eaten, different food sourcing and livelihood strategies being used, variation in access to natural resources, markets, jobs and other endowments, and differences in the perception of threats and responses to them. All of this heterogeneity exists in the context of significant societal and environmental change.

The thesis also suggests that current food security measures underestimate food insecurity because they are less able to pick-up on the utilisation and stability elements of food security. In addition, the original HEA framework would likely have missed some of the significant findings from the thesis, although the adaptation of the framework still had limitations that need to be addressed for future research.

In terms of practical implications, policymakers and stakeholders need to be aware of the heterogeneity that exists even within very small communities and that any change – either through economic or environmental change or through development or adaptation projects – could increase inequality.

The theoretical implications of the findings are that new ways of researching and conceptualising food security are required in order to understand the complexity of the subject. Incorporating new methodologies, measurements and theories, particularly those drawn from food sovereignty and food resilience, could extend the food security literature in this area. Resilience theory also needs to be aware of scalar, spatial and temporal variance in vulnerability and resilience. It also asserted that vulnerability and resilience should be seen as “rough antonyms” (Adger, 2000; Barnett, Lambert and Fry, 2008; Mochizuki *et al.*, 2018; Wilson, 2018). The ability of the Rama to be resilient is bound up in the same factors that influence vulnerability. Human geography can be a fruitful discipline in which to trial new conceptions of resilience theory because of its considerations of scale, space and time.

This thesis has contributed a fine-grained understanding of the Rama's food security. It has adapted the HEA to be an effective tool for achieving this and shown that more detailed analysis of factors such as land issues, market integration and food sharing can be included. The PhD has demonstrated that a holistic, geographically specific analysis of food security within a community is required in order to understand how vulnerability and resilience are constructed. As a result, more effective policies can be designed that help the most vulnerable in this, and other similar, communities.





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## Appendices

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Appendix 1: Household survey template

Appendix 2: Dietary survey template

Appendix 3: List of fish species eaten by the Rama

Appendix 4: Draft interview schedule

Appendix 5: Livelihood zone description for the Caribbean Coast of Nicaragua





## Appendix 2: Dietary survey template

Día \_\_\_\_\_

Fecha: el \_\_\_ de \_\_\_\_\_ 2016

Casa de \_\_\_\_\_

### Ayer

D) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?
A) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?
C) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?

### Hoy

D) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?
A) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?
C) Tipo	Cantidad	Como se consiguió?	De quién/donde?	Precio?	Quién lo produjo?

### Appendix 3: List of fish species eaten by the Rama

Rama Name	Scientific Name	Eaten?	Habitat	Cost*	Notes
Angel tooth	Diodon hystrix			High	
Angel Fish	Mullus auratus	Yes	Lagoon	Med	
Angel Fish	Polydactilus oligodon	Yes		Med	
Barracuda	Merluccius albidus	Yes		Low	
Black seashark	Alopias vulpinus	No			
Bony Fish	Albula nemoptera	Yes	Lagoon	Low	
Devil Snapper	Haemulon striatum	No			
Eli	Batrachoides surinamensis	Yes			
Eli	Synodus foetens	Yes	Lagoon		
Eli	Trachinocephalus myops	Yes	River	Low	
Hog Jack	Selene stapinnis	Yes	Sea	Low	
Lagoon Jack	Alectis ciliaris	Yes	Lagoon	Low	Yellow
Lagoon Jack	Caranx hippos	Yes	Lagoon	Low	Yellow
Lagoon Jack	Uraspis secunda	Yes	Lagoon	Med	
Lagoon Sandfish	Lobotes surinamensis	Yes	Lagoon	Med	Nice!
Lagoon Shad	Diapterus auratus	Yes	Lagoon	Low	
Lagoon Sharkle	Eucinostomus gula	Yes	Lagoon	High	
Lagoon Sharkle	Eucinostomus melanopterus	Yes	Lagoon	High	
Long Yard	Fistularia petimba	Yes		Low	
Machate Fish	Ariasoma balearicum				
Mackerel	Decapterus macarellus	Yes		High	
Mackerel	Elops saurus	Yes		High	
Mackerel	Scomberomorus cavalla				
Maligas	Conodon nobilis	Yes		Med	
Manta Rae	Manta birostris	No			

\*Low cost = c. 12C\$/lb / Med cost = c. 24\$/lb / High cost = c. 35C\$/lb

Rama Name	Scientific Name	Eaten?	Habitat	Cost*	Notes
Moda	Epinephelus adsonionis	Yes	River	High	
Mog Fish	Bothus ocellatus	Yes			
Mog Fish	Citharichthys sp	Yes	Lagoon	Low	Good price in Pacific, but not BF
Moga	Prionotus punctatus		River		
Mollet	Chirocentrodon bleekeriianus	Yes		Low	
Motruss	Acanthostracion quadricornis	Yes			Popular in Japan/China
Pak Coa Fish	Chaetodipterus faber	Yes		Low	
Pinka	Oligoplites saurus	Yes			
Pispis	Cynoscion similis	Yes		Med	
Rack Snapper	Acantharus bahianus	Yes	Sea		
Red Drummer	Umbrina coroides		Lagoon	High	
Red Mouth (Red Lips) Snapper	Haemulon carbonarium	Yes		Low	
Red Shackle	Lutjanus synagris				
River Drummond	Seriola rivoliana	Yes		Low	
Rock Fish	Holocanthus tricolor	Yes		Med	
Rock Snapper	Xyrichtys novacula	No			
Rock Snapper/Old Wife	Melichthys niger	Yes	River	High	Black, grey and red versions
Saleen	Mugil cephalus	Yes	River	High	
Sand fish	Mycteroperca rubra				
Sardine	Harengula jaguana	Yes		Low	
Sardine	Ophisthonema oglinum	Yes		Low	
Sea Jack	Caranx bartholomaei	Yes	Sea	Low	Green/Black
Sea Jack	Chloroscombras chrysurus	Yes	Sea	Low	Green/Black
Sea Jack	Trachinotus falcatus	Yes	Sea	Med	
Sea Jack	Thunnus albacares	Yes		High	

\*Low cost = c. 12C\$/lb / Med cost = c. 24\$/lb / High cost = c. 35C\$/lb

Rama Name	Scientific Name	Eaten?	Habitat	Cost*	Notes
Sea Jack	<i>Peprilus alepidotus</i>	Yes	Sea	Low	
Sea Sandfish	<i>Lutjanus apodus</i>	Yes	Sea	Med	
Sea Sandfish	<i>Lutjanus griseus</i>	Yes	Sea	Med	
Sea Shad	<i>Epinnula magistralis</i>	Yes	Sea	Low	
Sea Shark	<i>Mustelus canis</i>				
Sea Snapper	<i>Epinephelus striatus</i>	Yes		Med	
Sea Snapper	<i>Calamus bajonado</i>	Yes		High	
Shark	<i>Carcharhinus falciformis</i>	No			
Shark	<i>Carcharhinus leucas</i>	No			
Shark	<i>Sphyrna media</i>	Yes		High	
Snook	<i>Centropomus ensiferus</i>	Yes		High	
Snook	<i>Centropomus parallelus</i>	Yes		High	
Snook	<i>Centropomus pectinatus</i>	Yes		Low	
Snook	<i>Centropomus undecimalis</i>	Yes		Low	
Stingray	<i>Dayatis americana</i>		Lagoon	Low	
Stingray	<i>Himantura schmardae</i>		Sea	Low	
Swordfish	<i>Makaira nigricans</i>				
Swordfish	<i>Xiphias gladius</i>	Yes		Good	
Tarpon	<i>Megalops atlanticus</i>		Lagoon		
Tonkey (Lagoon)	<i>Bagre bagre</i>	Yes	Lagoon		
Tonkey (River)	<i>Bagre marinus</i>	Yes	River		
Tonkey (Sea)	<i>Cathorops spixii</i>	Yes	Sea		
Turkuk	<i>Scorpaena brasiliensis</i>	Yes		Low	
White fish	<i>Caulolatilus cynaops</i>				
White fish	<i>Mycteroperca tigris</i>				

\*Low cost = c. 12C\$/lb / Med cost = c. 24\$/lb / High cost = c. 35C\$/lb

Rama Name	Scientific Name	Eaten?	Habitat	Cost*	Notes
White seashark	<i>Alopias superciliosus</i>	No			
Yellow Tail	<i>Ocyurus chysurus</i>	Yes		Good	
Yellow Tail	<i>Rhomboplites aurorubens</i>				
	<i>Alepisaurus freox</i>		Sea		
	<i>Monacanthus ciliatus</i>	No			
	<i>Cynoponcticus savanna</i>	No			
Equetus punctatus					
Nebris microps					
Acanthocybium solandri					

\*Low cost = c. 12C\$/lb / Med cost = c. 24\$/lb / High cost = c. 35C\$/lb



## **Appendix 4: Draft interview schedule**

### **Theme One: Food**

#### **Favourites**

What are your favourite foods?

Which foods are consumed most often?

Are there any foods you don't like?

Are these foods eaten at certain events or at certain times of the year?

What foods do you most look forward to having available?

#### **Preparation and Buying**

Who prepares the meals?

a) Who decides what to eat and when to eat?

b) Do some members of your household have particular preferences?

c) What are they?

d) Do some members of your household have large or small appetites?

Do you buy food in Bluefields? If so, where do you buy it?

How often do you buy things from dories?

Who are the people who sell in this way? Do they come from other Rama communities or Bluefields?

#### **Sharing**

Do you share your food with neighbours?

a) If so, who with, how, when and why?

b) Is there a formal system of sharing?

What causes food shortages?

When there are shortages, where do you buy food from?

Do sharing practices change when there are food shortages?

How else do you compensate for food shortages?

Do you own a fridge? If so, when did you buy one?

Did it change how you bought/prepared food?

Did it change what you buy?

#### **Traditional/Specific Food**

Does the community still catch and hunt Manatí?

Does the community still share it in the traditional way?

Has been a decline in animal/game availability? If so, why?

How frequently do you eat fruits?

What traditional Rama dishes do you eat? (See list); If you don't eat certain ones, why not?

Are there any types of food that no one is able to buy/hunt/fish anymore?

## **Theme Two: Threats**

What are the main threats to your food?

### **Events**

When was the last time you had less food?

What can you tell me about it?

What effect did it have on your livelihood?

- a) Were you advantaged or disadvantaged by the event?

### **Response**

How did you respond to the event?

How would you respond differently to a similar event in the future?

How did the community respond to this event?

- a) Did people help one another?
- b) Did the government help the community?

Did your community do anything to stop this happening again?

What else can be done to reduce the impacts of similar events for your community/household?

Is there anything that prevents you being able to carry these out?

Who else is responsible for taking action to prevent the effects of the threats to your food?

Do you think your community should have more say in the changes made by others?

### **Decision-making**

How do you decide when to plant/fish/hunt?

Do you try to forecast the weather?

- a) How do you forecast the weather?
- b) To what extent do you base your actions on these forecasts?

Who forecasts the weather in your community?

- a) How do you find out about it?

Are you able to access forecasts from Bluefields?

To what extent do you rely on this information?

How reliable is this information?

What decisions do you base on this information?

Who makes these decisions?

### **Theme Three: Income**

#### **Chamba**

How many times have you done one in the last year/month/week?

How long was the last one?

How much were you paid?

Why did you accept/go for that particular job?

Have you ever turned work down? Why?

What are the reasons for jobs coming available? (Particularly tasks related to farming)

Do you look for jobs when you need money, or take ones when they become available?

#### **Purchasing**

What are the principal sources of income you have?

How much of your money comes from selling your own goods/buying and selling/direct employment of some description?

What do you spend money on?

Do you save?

### **Theme Four: The Future**

What do you hope for the Rama in the future?

What things do you want to change?

What would you change yourself?

**Thank you for participating**

## Appendix 5: Livelihood zone description for the Caribbean Coast of Nicaragua

Livelihood Zone #16 – Caribbean Coast Traditional Fishing Zone		
<b>Food Crops</b>	Beans Rice Plantains	<p>This long, fishing-based coastal zone is characterized by vast palm-lined beaches, mangroves, estuaries and coastal lagoons. The borders of this zone extend from the shore inland about five to fifteen km, and reaches from the Honduran border south to Costa Rica. Annual precipitation averages 3,100 mm and falls mostly from May to January. Most of the zone’s residents rely on artisanal fishing practices; however, there are pockets of industrialized fishing enterprises in Puerto Cabezas, Bluefields, El Bluff, Cayos Perlas and Miskitos and the Corn Islands. Households living in the north, towards the Honduran border, will also engage in free-diving, collecting lobsters and other shell fish. Though fishing is important, households will also engage in subsistence farming, growing beans, rice and plantains. Livestock ownership is limited to pigs and poultry and, like the crops produced, livestock is reserved for household consumption.</p>
<b>Sold Crops</b>	N/A	
<b>Livestock</b>	Pigs Poultry	
<b>Cash Income</b>	Daily labor Fish sales Crop sales Livestock sales Trade Remittances	
<b>Main Markets</b>	Puerto Cabezas Bluefields Waspmam	
<b>Labor Migration</b>	They go on board ships or to USA	Nearly all households rely on farming to meet the bulk of their annual food needs. They will supplement production with shellfish, fish and livestock products, followed by food purchases.
<b>Hazards</b>	Floods Tropical storms Livestock disease and pests Crop disease and pests	<p>Fishing serves as the main source of revenue for all households. Better-off will pay laborers cash to work on their boats and sell their catch locally, to intermediaries or to the larger fishing enterprises for processing. The better-off may also engage in small commerce, selling food and non-food items in small shops. In addition to the cash earned from laboring on fish boats and farms, the poor may sell a portion of their crops immediately after the harvest to meet immediate or pressing cash needs.</p> <p>Underdeveloped infrastructure and poor transportation options limit market access for most households. Prices of staple foods are dictated by demand and by the intermediaries who operate in the zone. Grains are sold to intermediaries and are exported to larger trading areas within and outside the zone. Though uncommon, pigs and poultry sales are sold in the same manner as grains. Fish and other seafood are sold to fish processing plants within the zone, to local traders and to traders from Managua who transport them to larger cities or for export abroad. Scarce labor opportunities in the zone force many laborers to find employment outside the zone. Many will work on cruise liners or migrate to the United States or the Grand Cayman Islands. The zone’s sparse population, limited government presence and geographic remoteness attract drug trafficking.</p> <p>As in neighboring zones, strategies employed by households to recover from hazard-induced cash or food deficits are limited. Households will migrate out of the zone to look for work, consume wild roots, fruits and animals, solicit remittances from family members and engage in self-employment activities (legal and illegal).</p>