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# **Climate change, vulnerability, and migration in Myanmar**

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International Environmental Studies



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**Declaration**

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

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## **Abstract**

This thesis investigates the relationships between climate change, vulnerability, the environment, and livelihood practices within the Ayeyarwady Delta, and how those relationships influence rural to urban migration. Migrants in urban centers are then reviewed to examine issues surrounding access to employment, housing, and education for their children in Yangon's Hlaingtharyar Township.

Findings of this research demonstrate that both social and environmental variables comprise root causes, dynamic pressures, and unsafe conditions of vulnerability. Compounded with environmental hazards such as flooding, cyclones, rainfall, pests, and heat, vulnerable individuals are adversely impacted by climate change, which transitions environmental hazards into environmental disaster. Environmental disasters degrade and destroy livelihoods, exacerbating poverty. Communities employ adaptation strategies to confront environmental disasters, but worsening poverty and the increase in frequency and intensity of environmental disasters render current adaptation strategies insignificant to confront the effects of climate change. Thus, more individuals migrate away from rural areas as an adaptation strategy to confront the impacts climate change. The findings demonstrate that poverty is the root cause of vulnerability in the Ayeyarwady Delta, while climate change acts as the trigger event to spawn migration of individuals in poverty. The prospect of economic opportunities in urban centers pull migrants to Myanmar's cities. Migrants are able to access employment, although often in marginalized and exploitative industries. In parallel with employment challenges, housing and access to education for children prove degrading and inaccessible for many migrants in urban centers. Findings from this thesis determine that associated financial and social costs for migrants in urban centers do not deem their lives improved, but rather hardship compounds in alternate ways than in rural settings.

The phenomena of climate change, vulnerability, and migration produces the term 'climate-induced economic migrants' to encapsulate the form of migration identified in this research. To better recognize and protect climate-induced economic migrants, both national and international policy makers must acknowledge how climate change and poverty compound to drive migration. Climate-induced economic migrants will continue to migrate away from rural areas into urban centers to evade environmental disaster and their associated impacts. The purpose of migration is to seek improved economic wellbeing.



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## **Acronyms**

|        |   |
|--------|---|
| BBC    | British Broadcasting Corporation                                      |
| DMHMT  | Department of Meteorology and Hydrology, Ministry of Transport        |
| DPMIP  | Department of Population & Ministry of Immigration and Population     |
| FAO    | Food and Agriculture Organization of the United Nations               |
| GGADHT | Gazetter of General Administrative Department: Hlaingtharyar Township |
| GDP    | Gross domestic product  |
| ID     | Identification  |
| IDP    | Internally displaced person   |
| IHLCA  | Integrated Household Living Conditions Assessment                     |
| IOM    | International Organization for Migration                              |
| IPCC   | Intergovernmental Panel on Climate Change                             |
| LDC    | Least Developed Countries   |
| MCCA   | Myanmar Climate Change Alliance                                       |
| MIMU   | Myanmar Information Management Unit                                   |
| NGO    | Non-governmental organization   |
| NLD    | National League for Democracy   |
| PIDT   | Population and Immigration Department of Thabaung                     |
| USD    | United States Dollar  |
| UNDP   | United Nations Development Programme                                  |
| UNFCCC | United Nations Framework Convention on Climate Change                 |
| UNHCR  | United Nations High Commissioner for Refugees                         |
| USAID  | The United States Agency for International Development                |

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## 1. Introduction

Adverse effects of climate change drive migration because of the increased severity and frequency of environmental disasters. Between 1990 and 2010 the number of recorded environmental disasters doubled from 200 to 400 events per year (Kälen & Schrepfer, 2012; Emergency Event Database, 2010 as cited in Kolmannskog & Trebbi, 2010). Such an increase in environmental disaster events wreak havoc on society. Currently, 26.4 million humans are displaced each year due to environmental disasters; more than the number of both refugees and internally displaced persons (IDPs) displaced by conflicts, combined (Nansen Initiative, 2014b; IDMC, 2015 as cited in United Nations High Commissioner for Refugees (UNHCR), 2015). In 2008 alone, more than 36 million humans were displaced by environmental disasters (OCHA, 2010 as cited in Kolmannskog & Trebbi, 2010). Climate change will continue to impact humans within society, leading to increased migration as the adverse impacts of climate change increase.

When humans migrate, urban centers become areas of relocation. Human migration into urban centers alter urban landscapes and the relationships between people who reside in them. In fact, the year 2008 marked the first time in human history when more than half the world's population lived in urban settings instead of rural areas (Crisp & Refstie, 2011). Such a phenomenon does not come without cost. Frequently, migrants who move to cities within state boundaries are subject to 'outsider' perceptions by long-term residence (Ngan & Chan, 2013). And whether in the context of environmental disaster events or conflict, both IDPs and migrants have significantly less protection than refugees within cities (Crisp & Refstie, 2011). Therefore, hardship and challenges compound for both migrants and IDPs when in urban centers.

The developing world constitutes 90 percent of global urban growth (Crisp & Refstie, 2011). Rapid growth of urban centers presents numerous risks to migrants once in cities. Challenges migrants face are lack of access to health care, education, legal protection, and negative attitudes from long-term city residence (Crisp & Refstie, 2011). However, the phenomenon of migration to urban centers is multi-casual (Crisp & Refstie, 2011).

Myanmar is particularly vulnerable to the effects of climate change. In the 20 years between 1994 and 2014, Myanmar was identified as the second most affected country in the world from climate change (Kreft, Eckstein, Dorsch, & Fischer, 2015). Cyclones, floods, heavy rains, and extreme temperatures all impact the country (Department of Meteorology and Hydrology, Ministry of Transport (DMHMT), 2012). Most of Myanmar's population lives in

climate change exposed areas and are subject to potential environmental disasters (Myanmar Climate Change Alliance (MCCA), 2016). Furthermore, the majority of Myanmar's population works in the agriculture sector. Agriculture employs 64 percent of the labor force and produces 48 percent of the country's gross domestic product (GDP) (Sovacool, 2012). Most agriculture workers live in rural areas of the country, which exposes them to climate change risks with a low capacity to manage shocks (Nansen Initiative, 2014c; Asian Development Bank, 2012). Most of the population is vulnerable to the impacts of climate change.

Flooding is a frequent and potentially devastating event in Myanmar. Between 1980 and 2011, 50 percent of the total number of environmental disasters within the country were from floods (MCCA, 2016). Rainfall causes most floods and is a recurring phenomenon across the country. Rainfall usually originates in the mountains and highlands of the country, flooding the central plain and coastal areas of Myanmar (MCCA, 2016). Floods devastate large areas of land, particularly during monsoon season between June and October (DMHMT, 2012). During monsoon season, Myanmar receives 80 percent of its rain (Simmance, 2013). Flooding poses a significant challenge in Myanmar as the region of Southeast Asia will continue to experience record breaking rainfall (Lehmann, Coumou, & Frieler, 2015), which is expected to increase ten percent over the coming decades (Drakenberg & Wolf, 2013 as cited in McKinley et al., 2015). Furthermore, Myanmar's floods already have a significant impact on migration. As reliefweb (2017) indicates, ten floods have occurred in Myanmar over the last ten years, which caused both migration and displacement.

Another persistent environmental threat in Myanmar is cyclones. Cyclones threaten Myanmar due to its geographic position, flanked by the Bay of Bengal to the west, and the Andaman Sea to the south. In the last ten years, Myanmar has been struck by six cyclones (reliefweb, 2017). Tropical storms are not included in this number, which frequently batter Myanmar as well. Although cyclones repeatedly make landfall with Myanmar, the most devastating cyclone impact on the country was Cyclone Nargis in 2008. The cyclone was the third deadliest storm worldwide since 1900, killing more than 138,000 people in Myanmar (EM-DAT, n.d. as cited in Nansen Initiative, 2014c; Webster, 2008). The cyclone further displaced 1.6 million people and affected a total of 2.4 million people (EM-DAT, n.d. as cited in Nansen Initiative, 2014c; Webster, 2008). Although Cyclone Nargis serves as an extreme example of cyclone impact in Myanmar, the country regularly faces the threat of small-scale cyclones.

Environmental disasters particularly affect the Ayeyarwady Delta. Although research on the Ayeyarwady Delta remains limited, its area supports a population of 6,184,829 persons, of which 86 percent are considered rural (Department of Population & Ministry of Immigration and Population (DPMIP), 2015). Because the Ayeyarwady Delta supplies 60 percent of Myanmar's rice production (Burma River Network, 2016), shocks have potential for devastating effects. For example, inundation from floods in 2011 caused 1.2 million tons of rice to be lost (MCCA, 2016). Environmental shocks detriment individuals throughout the Ayeyarwady Delta through decreased revenue generation. Sudden, and slow, degradation of livelihoods, vulnerability, and the risk to disaster events have potential to spawn migration.

Myanmar currently experiences both population growth and population movement. Between 1950 and 2010 the urban population of Myanmar doubled from 16.2 percent to 31.4 percent (UN DESA, 2014 as cited in Nansen Initiative, 2014c). Furthermore, indicators suggest that a total of 54.9 percent of Myanmar's population will live in urban centers by the year 2050 (UN DESA, 2014 as cited in Nansen Initiative, 2014c). However, two-thirds of Myanmar's population still live in rural settings, while poverty is 85 percent higher in rural areas than urban areas (Asian Development Bank, 2012). All the while, the population of Myanmar's urban centers have grown, and will continue to grow, significantly (UN DESA, 2014 as cited in Nansen Initiative, 2014c). Although multi-causal, one of the main reasons for migration to urban centers in Myanmar is increased economic opportunity from employment (DPMIP, 2015).

The purpose of this research is to assess migration patterns from Myanmar's rural areas to urban centers. The Ayeyarwady Delta is used to research climate change as a driver of migration through its influence on environmental disasters. Furthermore, migrant access to employment, housing, and education for their children in urban centers, and the challenges they face once there, will be examined through the lens of Myanmar's Hlaingtharyar Township in Yangon Region.

## **1.1. Problem statement**

Indicators suggest an increase in the frequency and intensity of environmental disasters in Asian River Deltas, which exacerbate the early effects of climate change on human populations (Olli, Kummu, & Salmivaara, 2012). Floods, cyclones, rainfall, pests, and heat all impact the Ayeyarwady Delta, which increases the vulnerability of individuals. Current adaptation strategies are varied and limited as the impact of environmental disasters intensify. However, individuals are pressed to make challenging decisions when confronted by both the adverse effects of climate change and environmental disasters, especially when poverty is intrinsic in lives. Worldwide, individuals increasingly migrate away from rural settings as an adaptation strategy to confront climate change (Black, Bennett, Thomas, & Beddington, 2011). When migration away from the Ayeyarwady Delta occurs due to the adverse effects of climate change, Myanmar's urban centers become areas of relocation, with Yangon, Myanmar's economic hub, a destination city (Khaing, 2015; Htoo & Zu, 2016). Yet, migrants face challenges related to employment, housing, and education for their children within urban centers (Ngan & Chan, 2013). As migration increases within Myanmar, little research has materialized on how migrants from the Ayeyarwady Delta access employment, housing, and education for their children once in Yangon or other urban centers. Furthermore, the influx of migrants within Myanmar's urban centers may constrain employment, housing, and education for migrants' children, which dictates if livelihoods and wellbeing improve or decline compared to areas of residence prior to rural-urban migration.

## **1.2. Research objectives and research questions**

### **Research objective 1:**

To assess the impact of climate change on the variability of environmental disasters and its impact on migration away from the Ayeyarwady Delta.

### *Research question 1:*

How do different categories of people perceive the risk of climate variability in the Ayeyarwady Delta?

### *Research question 2:*

What strategies do different categories of people employ to confront environmental threats?

*Research question 3:*

To what degree has climate change contributed towards more frequent and more severe environmental disasters within the Ayeyarwady Delta during the last 10 years?

*Research question 4:*

How do different categories of people in the Ayeyarwady Delta define migration, and to what degree has environmental variability contributed towards an increase in migration, both voluntarily and forced, from the Ayeyarwady Delta during the last 10 years?

**Research objective 2:**

To assess to what degree migrants from the Ayeyarwady Delta are able to find employment, housing, and access to education for their children within Yangon.

*Research question 1:*

To what degree are migrants from the Ayeyarwady Delta able to find employment and housing in Yangon, and access services such as education for their children?

*Research question 2:*

To what degree do different categories of migrants from the Ayeyarwady Delta perceive that their income opportunities, housing situation, and access to education improved or declined in Yangon?

**1.3. Thesis outline**

This thesis is structured into 10 chapters. The first chapter has introduced the topics addressed and explored in this thesis. Furthermore, the research objectives and research objectives of this thesis were presented. The second chapter relates to the background of Myanmar, giving an overview of country statistics, population trends, and a brief historical context. The final section of the background chapter provides the case of environmental disasters within Myanmar, specifically highlighting the destruction Cyclone Nargis caused in the Ayeyarwady Delta.

The third chapter presents the theory used in connection to the phenomena researched. The analytical framework is addressed, used to contextualize the empirical findings to answer the research questions. Prior research and theory on the topics explored in this thesis is presented, providing a platform where the findings can contribute to new knowledge within the research field.

The fourth chapter presents the methodological approach implemented for this thesis. First, the selection of the study area is discussed followed by the process so select informants for the data collection. The data collection procedure, with different interview strategies, is provided and justified. Then, the data analysis approach is explained, followed by a discussion of the limitations encountered, and ethical considerations incorporated, in this thesis. The fifth chapter explores the multiple study areas visited in greater depth, while contextualizing each area in the overall focus of this thesis.

The sixth chapter presents the findings for climate variability and vulnerability in the Ayeyarwady Delta. Specifically, this chapter employs the analytical framework to highlight the findings into the progression of vulnerability individuals face within the Ayeyarwady Delta. Furthermore, environmental hazards' transition to environmental disasters is emphasized, while community adaptation strategies are placed into the discussion to provide explanation for how individuals confront environmental disasters. When presenting adaptation strategies, migration as an adaptation strategy is introduced.

The seventh chapter continues to present the findings. The first part of the chapter confronts the issues of whether environmental disasters are spawned from human-induced or naturally-occurring processes. The second part of the chapter places sudden-onset and slow-onset disasters into the context of the Ayeyarwady Delta. In closing, voluntary and forced migration away from the Ayeyarwady Delta, and the triggers to drive that migration, are presented.

The eighth chapter is the final findings chapter, where migrant experience in urban centers is explored. Specifically, Yangon's Hlaingtharyar Township is used to understand migrant access to employment, housing, and education for their children in urban centers. Furthermore, migrant experience in urban centers is compared to their prior lives in order to see if their lives have improved or declined post-migration.

The ninth chapter discusses the findings in relation to the theory. The issues of climate change, vulnerability, poverty, adaptive capacity, push-pull factors of migration, hardship for

migrants in urban centers, and gaps for migrant protection are explored here. The theory is used to connect the findings to a 'higher level' of context in the overall discussion of the topic.

The conclusion chapter summarizes both research objective 1 and research objective 2. A brief discussion surrounding voluntary and forced migration related to the phenomena research is presented. To encapsulate the form and scope of migrants in this research, the term *climate-induced economic migrants* is introduced. In closing, climate-induced economic migrants are positioned in relation to national and international policy, and how action must be taken to recognize such individuals.

## 2. Background

The first part of this chapter introduces Myanmar, gives statistical facts about the country, and presents its current political situation. The second part of this chapter gives an overview of the environmental hazards and environmental disasters the country has faced, and is currently faced with.



Map 1. Myanmar country map divided by Regions and States. Map: Myanmar Information Management Unit (2016a)



## **2.1. Myanmar**

Myanmar is the second largest country in mainland Southeast Asia (Nansen Initiative, 2014c), with a land area of 676,577.20km<sup>2</sup> (DPMIP, 2015). The country hosts a population of 51,486,253 people (DPMIP, 2015). Myanmar is divided into seven States and seven Regions (DMHMT, 2012). Within the States and Regions, there is further demarcation of administrative levels. Townships are the highest administrative level. In rural townships first come village tracts then villages, and within urban townships the highest administrative level are towns, and then wards (DMHMT, 2012; Myanmar Information Management Unit (MIMU), 2015). Myanmar has three seasons throughout the year, comprised of rainy monsoon season from June through October, Winter from October through February, and Summer from February through June (DMHMT, 2012).

Within Myanmar, 70 percent of the population resides in rural areas (DPMIP, 2015; United Nations Development Programme (UNDP), 2017). However, 26 percent of the overall population lives in poverty, with the percentage doubled in rural areas (UNDP, 2017). Because of Myanmar's large rural population and high poverty rate, the country is considered a least developed country (LDC) (Nansen Initiative, 2014c). The country's economy is largely based on agriculture, which comprises 45 percent of its GDP and 50 percent of employment (Simmanee, 2013). When agriculture is combined with the livestock and fishery industries, those three sectors compose of over 70 percent of the country's employment (DMHMT, 2012). Moreover, 75 percent of Myanmar's rural population depends purely on agriculture for employment (DMHMT, 2012).

Myanmar has experienced political turmoil since gaining independence in 1948. In 1962, a military coup seized power in the country and maintained control until 2011 (British Broadcasting Corporation (BBC), 2017a). In 2011, a semi-civilian government begun transforming the country from an authoritarian military regime to a democratic state (Nansen Initiative, 2014c). During this transition, decades of closed-door economic policy shifted to a market economy, lifting long-standing economic sanctions and ushering in foreign investment (Nansen Initiative, 2014c). On 8 November, 2015, the National League of Democracy (NLD) won almost 80% of electable seats in the country's National Election (BBC, 2015). The NLD, headed by Nobel Peace Prize laureate Aung San Suu Kyi, is the first non-military government to take power in Myanmar for over 50 years (BBC, 2017b). On 30 March, 2016, Htin Kyaw was

inaugurated as president, the first civilian to hold that position since the military seized control of the country via a coup in 1962 (Lewis, 2016). Recent developments have meant rapid social, political, and economic transformation for the country (Asian Development Bank, 2012).

However, the NLD has high expectations mounting on them. A party priority is to bring peace to border areas where the government and armed ethnic groups have fought since Myanmar's independence in 1948, being coined the world's longest running civil war (BBC, 2017a; Winn, 2012). Under the 2008 constitution, the military automatically holds 25 percent of seats in parliament, giving them continued influence while the NLD attempts to move away from their legacy (BBC, 2015).

The country's economic transformation influences Myanmar's urban centers. Currently, all 10 of Myanmar's largest urban areas are increasing in size and population, shown through a nearly doubling of the country's urban population in 60 years between 1950 and 2010 (World Bank Group, 2015a; UN DESA, 2014 as cited in Nansen Initiative, 2014c). Furthermore, Yangon's economic hub generates 20 percent of the country's GDP through trading and commerce (Khaing, 2015). The population growth of Myanmar's urban centers correlate with increased economic activity within them (Khaing, 2015). With a focus on growing the economy, as well as continued ethnic strife in the country's border regions, environmental issues fall low on Myanmar's political agenda.

## **2.2. Myanmar's environmental disasters**

Myanmar is subject to frequent environmental hazards and environmental disasters. Myanmar experiences a variety of disasters including "tropical cyclones, floods, rain-triggered landslides, earthquakes, and wildfires" (Nansen Initiative, 2014c, p. 40). Furthermore, high-temperatures and drought also impact the country (DMHMT, 2012). Thus, Myanmar is highly vulnerable to environmental disasters but has a low capacity to manage and respond to them (Nansen Initiative, 2014c). Furthermore, Yangon is ranked number four in the world for cities facing extreme risk to climate change (CCVI, 2013 as cited in Nansen Initiative, 2014c).

The most extensive environmental disaster to hit Myanmar was Cyclone Nargis in 2008. Cyclone Nargis hit Myanmar's most vulnerable point, the densely packed Ayeyarwady Delta, sending a 40-kilometer storm surge inland causing widespread destruction and death (Nansen Initiative, 2014a). However, the impact of Cyclone Nargis would have been less extensive given

a different political standing at that. Under military junta rule, Myanmar's former Senior General Than Shwe blocked humanitarian aid into the country, believing Myanmar could manage its own post-disaster response (Stover & Vinck, 2008). Yet, the destruction surpassed Myanmar's response capacity, thus signifying one of the factors of a high casualty and displacement rate.

The resulting consequences of Cyclone Nargis had extensive impact on the country. The economic costs of the disaster were 4 billion United States Dollars (USD) (ESCAP & UNISDR, 2012 as cited in Nansen Initiative, 2014c). The 4-meter high storm surge devastated the Ayeyarwady Delta destroying homes, along with agricultural crops (Stover & Vinck, 2008). Out of 3.2 million acres of rice paddies within the Ayeyarwady Delta, 500,000 were destroyed and unable to be planted for the approaching monsoon growing season (UNOCHA, 2008 as cited in Stover & Vinck, 2008). The cyclone severely affected the country, and further highlighted the government's inefficiencies to handle such a response.

In 2015, the combination of monsoon rains and Cyclone Komen caused flooding within the country. More than 100 deaths and 1.6 million people were affected (Burki, 2015). Myanmar receives monsoon rains annually, but certain storms have the capability to become increasingly severe. In the case of the 2015 floods, Myanmar experienced its worst disaster since Cyclone Nargis in 2008 (Burki, 2015).

Monsoon rains and overall rainfall patterns have shifted within Myanmar. The monsoon season between June and October has decreased in duration, characterized by late-onset and early-withdrawal of rains (DMHMT, 2012). Moreover, between 1951 and 2007 rainfall has increased by 29-millimeters each decade (DMHMT, 2012). Thus, a clear trend of increased frequency and irregular rainfall exists as well (ADM, 2013 as cited in Simmance, 2013).

### 3. Literature review

#### 3.1. Climate change as a driver of voluntary and forced migration

The Intergovernmental Panel on Climate Change (IPCC) (2014) defines climate change as A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings [*sic*] such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use. (p. 5)

As seen, climate change encompasses a wide spectrum of focus, with many different facets, which affects each other at all times. Although climate change focuses on the phenomenon of specific systematic changes, the driving force behind such change derives from a global temperature increase. The warming causes irreversible impacts across the earth (IPCC, 2014). As such, numerous record-breaking climate events have been experienced the last 30 years (Lehmann et al., 2015).

Climate change increasingly impacts both humans and society. In recent decades, climate change has impacted natural and human systems across all continents and oceans (IPCC, 2014; Boano, Zetter, & Morris, 2008). Furthermore, Docherty and Giannini (2009) state, “climate change will force millions of people to flee their homes over the coming century” (p. 344). Coinciding with forced movement, humans may voluntarily move in the face of climate change as well (Jäger et al., 2009 as cited in Warner, 2010; Warner et al., 2008, 2009 as cited in Warner, 2010). Therefore, the impact of climate change poses a serious threat to human systems and communities, which force humans to make drastic decisions in the face of its impact.

Climate change has the potential to spawn migration. As Krishnamurthy (2012) indicates, a detrimental aspect of climate change is the pressure put on individuals to migrate. It is expected that the people who migrate, or are displaced, due to climate change may significantly outnumber traditional refugees in the future (Docherty & Giannini, 2009). The sheer number of individuals which may have to move due to climate change presents research gaps in current debate. However, Kolmannskog and Trebbi (2010) emphasize that climate change triggers human movement, so the debate surrounding it is justified. Furthermore, climate change is suspected to impact developing countries hardest, which exacerbates vulnerability, and acts as a trigger for human movement (Kolmannskog, 2008). Thus, human movement is a reality in connection to

climate change. The International Organization for Migration (IOM) (2011) defines forced migration as

A migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes (e.g. movements of refugees and internally displaced persons as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects). (website)

The above definition showcases that persuasion, mainly in regards to life or livelihood threats, define forced migration and distinguishes it from other forms of migration. Essentially, livelihood opportunities are no longer possible due to severe circumstances, and lives may be threatened (Krishnamurthy, 2012). Furthermore, the definition goes as far to highlight *environmental disasters* as a cause of forced migration. Thus, when individuals become displaced through disaster events, forced migration may explain their movement.

Forced migration differs from voluntary migration, primarily separating itself in one key aspect of the definition. The IOM (2011) defines migration as

The movement of a person or a group of persons, either across an international border, or within a State. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes; it includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification. (website)

What separates forced migration from a voluntary decision to migrate is how the terms *coercion* and *threats* are used in the forced migration definition. Of course, voluntary migrants must commit to movement. However, in forced migration the individual, or family, faces threats which correlate to their persuasion to leave. Therefore, when climate change threatens individuals' lives and livelihoods, they are forced to migrate if other options, such as adaptation strategies, become exhausted.

However, due to multi-casual reasons, the distinction between forced and voluntary migration is difficult to determine, and thus distinguish (Nansen Initiative, 2014a; Krishnamurthy, 2012). There is a broad acceptance that migration, both forced and voluntary, will increase due to climate change; but exact numbers and extent of migration also prove difficult to predict (Kolmannskog & Trebbi, 2010; Krishnamurthy, 2012; Castles, 2003; Renaud, Bogardi, Dun, & Warner, 2007). Furthermore, environmental disasters are expected to increase in both severity and intensity in the future, which will spawn further migration (Kälin and Schrepfer, 2012; Krishnamurthy, 2012). Therefore, although a homogeneous boundary exists in relation to voluntary and forced migration, climate change *does* have a direct influence on human

movement (Kälin & Schrepfer, 2012). Kolmannskog (2008) demonstrates that the “form” and “scope” of the *forced* aspect in migration, related to climate change, can only be guessed (p. 4).

One reason for migration uncertainties is that humans have migrated throughout their whole history, for numerous different reasons. One reason for migration in the past, however, is the link between climate, environment, and humans (Kolmannskog, 2008). Therefore, not all migration related to environmental change is forced migration. In fact, migration in the face of environmental change is one of the oldest coping strategies of human beings (Kolmannskog, 2008; Castles, 2003; Boano et al., 2008). Furthermore, environmental degradation is just one factor for migration out of a whole complex set of reasons (Lein, 2010). It is therefore “extremely hard to distinguish between environment, economic, and political factors” when analyzing the link between migration and climate change issues (Myers & Kent, 1995 as cited in Castles, 2003, p. 15). Thus, the blend of complexity between climate change and migration creates a multi-casual context with no one, simple, trigger related to either voluntary or forced migration.

Although forced migration from climate change exists, many uncertainties remain. For one, the phenomenon between anthropogenic climate change and migration is relatively new (Docherty & Giannini, 2009; Boano et al., 2008). It proves difficult to distinguish climate change in the web of complex reasons when forced migration occurs (Nansen Initiative, 2014a; Krishnamurthy, 2012; Boano et al., 2008). More so, research on the direct link between climate change and forced migration remains limited (Piguet, 2008). Even when a direct relationship exists between climate change and migration, multiple other factors play a role in migration (Kälin & Schrepfer, 2012). However, environmental harm is increasingly recognized as a driver of forced migration (Kolmannskog, 2008).

Of course, factors related to migration in Southeast Asia exhibit multi-casual reasons as well. Yet, the factors emphasized often relate to poverty, development status, and conflict (Nansen Initiative, 2014a). Environmental factors have yet to be researched extensively in connection to migration throughout Southeast Asia (Nansen Initiative, 2014a). The existing reasons, however, can all spawn from environmental causation. As Kolmannskog (2008) emphasizes, vulnerability to environmental threats, such as disasters, largely determines the role climate change plays to impacts human beings.

### 3.2. Vulnerability and its impact on migration

Vulnerability is the underlying connection between research objective 1 and research objective 2 in this study. Although both research objectives are unique in their respective state, *vulnerability* inherently connects the two in regards to the decisions individuals face when confronted by unsurmountable environmental hazards and life situations. As Piguet (2008) states, “natural factors are not the sole cause of migration and that the economic, social and political situation of the zone under threat can, depending on the case, increase or decrease the flow of migrants” (p. 3). Therefore, vulnerability exists as the central theme in this research because environmental hazards reveal structural vulnerability, dependent on the physical structure, poverty, and power structures, which encompass social vulnerability (Oliver-Smith 2002, 2003 as cited in Warner, 2010). Vulnerability constantly fluxes between both physical and social processes (Kelly & Adger, 2000 as cited in O’Brien et al., 2004b). It is therefore critical to research vulnerability in its holistic form to fully understand the phenomena of the research objectives.

Humans are at greater risk of environmental disaster impact, with marginalized groups most impacted, when high vulnerability exists. Thus, vulnerability acts as a catalyst towards migration. As the IPCC (2014) states, “people who are socially, economically, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change” (p. 6). Furthermore, the IPCC (2014) has high confidence that climate-related hazards “exacerbate other stressors, often with negative outcomes for livelihoods, especially for people living in poverty” (p. 6). Direct impact on livelihoods, reduction in crop yields, and destructions of homes are a few examples of how environmental hazards affect impoverished individuals (IPCC, 2014). Climate change also directly increases inequality and worsens poverty (IPCC, 2014), which in turn exacerbates impacts already experienced by climate change. The IPCC (2014) concludes that risks are “unevenly distributed” and generally “greater for disadvantaged” people (p. 12). Vulnerability plays a critical role in how people are impacted in the face of disaster events, with impoverished individuals adversely impacted.

Disasters occur when hazards combine with human *vulnerability*, which intensifies the likelihood of migration (Kolmannskog & Trebbi, 2010; Kirsch-Wood, Korreborg, & Linde, 2008). Vulnerability is defined as

the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process). (Wisner, Blaikie, Cannon, & Davis, 2004, p. 110)

Therefore, vulnerability determines the capacity to which either an individual or family can withstand environmental hazard events. However, vulnerability is further defined as

A combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk by a discrete and identifiable event [...] in nature and in society. (Wisner et al., 2004, p. 11)

Vulnerability encompasses both natural and social elements to produce a disaster (Wisner et al., 2004). Thus, vulnerability is *the* critical factor to produce a disaster, which then influences migration. Although environmental hazards play a significant role in migration patterns, vulnerability within societal processes trigger disasters. Therefore, the impact environmental disasters have on different groups of people vary because vulnerability levels differ between individuals, households, communities, and States (Wisner et al., 2004).

The United Nations International Strategy for Disaster Reduction (2009) define disasters as

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources [...] Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation. (p. 9)

Therefore, disasters are directly related to an individual's vulnerability level. Social conditions play a critical factor in what turns an environmental hazard into an environmental disaster.

Wisner et al. (2004) explains that "disasters are a complex mix of natural hazards and human action" (p. 5). Of course, an environmental hazard determines an actual event which threatens humans, but the hazard transforms into a disaster when such individuals endure established vulnerability. Disasters should be viewed in a larger context of society, as well as the reasons why people are vulnerable in relation to such phenomena, to better understand how environmental hazards impact humans (Wisner et al., 2004). As Wisner et al. (2004) states,

A disaster is not a single, discrete event. All over the world, but especially in LDCs, vulnerable people often suffer repeated, multiple, mutually reinforcing, and sometime simultaneous shocks to their



families, their settlements and their livelihoods. These repeated shocks erode whatever attempts have been made to accumulate resources and savings. (p. 5)

Disasters span timeframes, and are not limited to single events. Recurrent disasters leave people in a continued state of vulnerability. When environmental disasters compound, vulnerability worsens due to repeated impact on livelihoods. The transition from an environmental hazard event turning into an environmental disaster largely depends on the vulnerability people face in their everyday lives.

Social and environmental processes determine vulnerability. Because of economic conditions, people must inhabit areas susceptible to environmental hazards (Wisner et al., 2004). Often, people prone to environmental hazards work in agriculture and depend on farming for economic means, therefore making agriculture a particularly vulnerable activity in the face of climate change (Kolmannskog, 2008; Krishnamurthy, 2012). Thus, farmers may migrate due to failing crops, or the degradation of work, which impacts economic earnings (Warner, 2010). Such an example represents the link between environmental degradation and migration.

Of course, the simple fact humans reside in river deltas expose them to environmental hazards. However, social factors encompass both economic and political variables, and in turn determine which individuals, and groups, are at risk of environmental disaster impacts (Wisner et al., 2004). As Wisner et al. (2004) states “key variables explaining variations of impact include class (which includes differences in wealth), occupation, caste, ethnicity, gender, disability and health status, age and immigration status (whether 'legal' or 'illegal'), and the nature and extent of social networks” (p. 11). Thus, the vulnerable, regardless of social group, are susceptible to environmental disaster impacts. Elements of vulnerability, largely dependent on social processes, include the location of peoples’ homes, work place, infrastructure of home and work place, information available, health, financial standing, and preparedness (Wisner et al., 2004). However, poverty is a critical factor which determines vulnerability within social processes.

In fact, the overriding factor to all vulnerability is poverty. In parallel, vulnerability exacerbates poverty. Poverty correlates to the level of vulnerability experienced by different individuals. Although the two factors do not hinge on each other, both poverty and vulnerability correlate closely (Wisner et al., 2004). Therefore, poor households become disproportionately affected when environmental disasters strike, largely derived from their level of vulnerability (Lein, 2010). In contrast, wealthier households can usually withstand and recover from disasters quicker than poor households (Jäger et al., 2009 as cited in Krishnamurthy, 2012). Vulnerability

to climate change largely depends on the socioeconomic standing of those impacted (O'Brien et al., 2004a) The poor are disproportionately affected by environmental disasters, and climate change will only continue to worsen their vulnerability, while impacting them further (Renaud et al., 2007)

To explore vulnerability on a deeper level, an understanding of poverty within social processes is necessary. Wisner et al. (2004) distinguishes three elements which differentiate the rich and poor in relation to vulnerability: 1. Money can purchase disaster-resistant materials and provide engineering which minimizes the impact of disasters on the rich; 2. The rich decide where they want to live, while the poor usually don't have options to where they live; and 3. The outcome of disasters is usually less impactful on the rich versus the poor, due to stockpiled capital. These criteria show how the rich are far better suited to withstand the impacts of environmental disasters, whereas the poor's vulnerability situates them in a disadvantageous societal position. Vulnerability determines whether an individual has an advantageous or disadvantageous position within society in the face of an environmental disaster. Essentially, the causes of vulnerability are "generated by social, economic and political processes that influence how hazards affect people in varying ways and with differing intensities" (Wisner et al., 2004). Therefore, it is necessary to track the progression of vulnerability to identify causes and effects of disasters on individuals.

In this study, the Pressure and Release (PAR) model and Access model will be employed to track vulnerability. The models were designed by Wisner et al. (2004) and come from the second edition of their book, "At Risk: Natural hazards, people's vulnerability and disasters". Wisner et al. (2004) highlights the fact that natural hazards, although harmful, are not a threat in themselves to society (Wisner et al., 2004). In fact, what makes natural hazards so threatening is institutionalized societal trends and pressures, which in turn make human communities vulnerable (Wisner et al., 2004). Only when such institutions are given attention can underlying reasons for vulnerability be explored. Of course, as Wisner et al. (2004) stresses, the 'natural' aspect of disasters cannot be separated from social processes. The larger trends which put pressure on communities are outlined in the PAR and Access models.

Because vulnerability underlies migration, environmental disaster events which spawn migration must be researched. Such research determines if climate change drives migration, both voluntary and forced, but also explores if communities have the means to prepare and cope with

climate change. Essentially, the research looks to see what makes people vulnerable to the effects of climate change.

The PAR model is used to track vulnerability. As Wisner et al. (2004) states, the risks people face must be seen as a “cross-cutting combination of vulnerability and hazard. Disasters are a result of the interaction of both” (p.49). Without vulnerability to hazard events, there would be no disaster. Thus, the factors which lead to vulnerability must be understood.

The PAR model is a tool “for showing how disasters occur when natural hazards affect vulnerable people” (Wisner et al., 2004, p. 50). Interestingly, the underlying cause of a disaster may be the social processes completely separated from the physical hazard itself (Wisner et al., 2004). The model has two opposing forces. On the left side of the model, the progression of vulnerability, and on the right side, the hazard event (Figure 1). Both forces cumulate to trigger an environmental disaster.

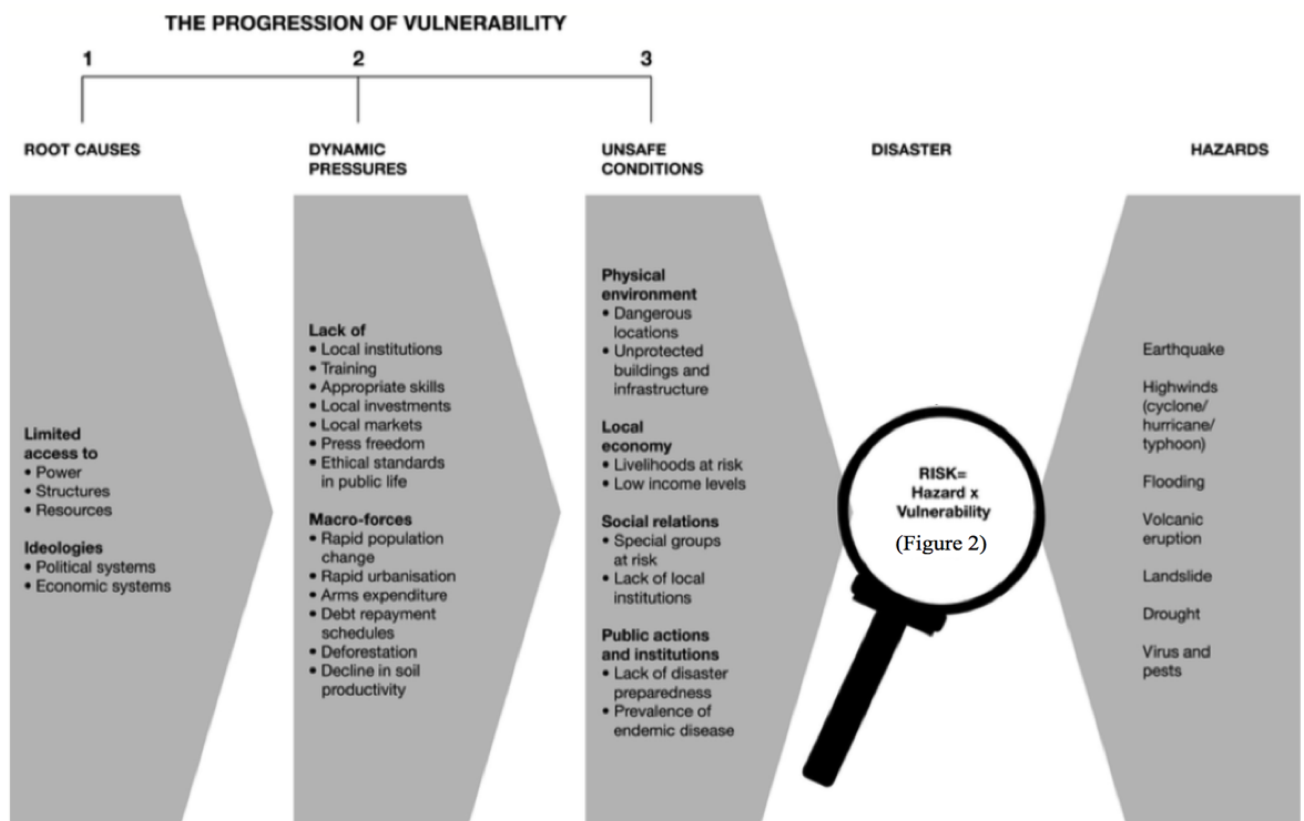


Figure 1. Pressure and Release (PAR) model: the progression of vulnerability (Wisner et al., 2004, p. 51 adapted by Michael Foster, 2017).

The progression of vulnerability in the PAR model is a linear chronology comprising three items. The first stage, *root causes*, seeks to interrelate a “set of widespread and general processes within a society and the world economy” (Wisner et al., 2004, p. 52). Such causes may be spatially and temporally distant, and as such, intertwined with cultural and societal norms (Wisner et al., 2004). As Wisner et al. (2004) explains “root causes reflect the exercise and distribution of power in a society” (p. 53). Therefore, it is important to consider if those who are most vulnerable have access to power because root causes largely relate to institutionalized aspects of greater society.

*Dynamic pressures* incorporate “economic, social and political patterns” which channel causation from root causes to unsafe conditions (Wisner et al., 2004, p. 53). In LDCs, dynamic pressures are often the cause which spawns rural to urban migration (Wisner et al., 2004). Most often they are associated with inequalities inherent within communities (Wisner et al., 2004). This stage in the progress of vulnerability is critical to the triggers which spawn migration. Furthermore, if individuals had access to information which they previously did not, or if inequalities were lessened, the most vulnerable may develop coping and adaptation strategies which mitigate environmental disasters and the associated impact on migration.

*Unsafe conditions* “are the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard” (Wisner et al., 2004, p. 55). Thus, it is the tangible hardship that many communities face when located in environmentally disaster-prone areas. This may be through housing location, lack of protection by the state, unsafe buildings, or agricultural land which is prone to rapid and severe destruction (Wisner et al., 2004). Often, the unsafe conditions reflect on peoples’ livelihood opportunities.

On the right side of the PAR model, there is the hazard event itself. In the case of this study, flooding, cyclones, rainfall, pests, and heat will be the hazards focused on. When all factors, from the progress of vulnerability to the hazard event, compound, a disaster occurs, which then delves further into issues of vulnerability in the Access model.

The Access model essentially describes the *pressure point*, which in effect supports the PAR model. “The Access model sets out to explain at a micro-level the establishment and trajectory of vulnerability and its variation between individuals and households” (Wisner et al., 2004, p. 88). The Access model deals with peoples’ “capabilities, assets and livelihood opportunities that will enable them (or not) to reduce their vulnerability and avoid disaster”

(Wisner et al., 2004, p. 88). In the case of this research, the Access model shall track vulnerability until the point of migration. In box 7 of the Access model (Figure 2), when an individual would otherwise cope and adapt in the impacted area following an environmental disaster, this study shall research if *the* response is in fact migration, and then whether movement constitutes voluntary or forced migration. As the purpose of the Access model is associated with long-term processes and social events (Wisner et al., 2004), at a certain point, if an environmental disaster proves detrimental to an individuals' level of resilience, or overpowers their already vulnerable societal position, it has potential to spawn migration.

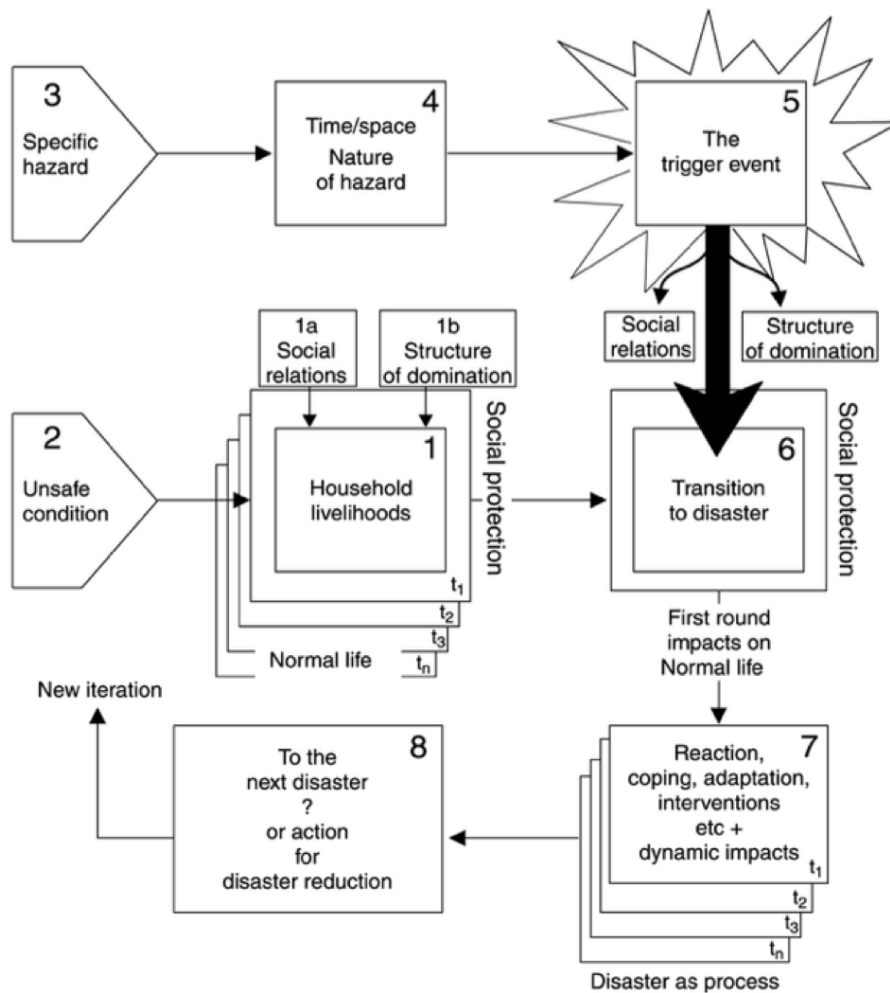


Figure 2. The Access model in outline (Wisner et al., 2004, p. 89).

Both models intend to provide a framework to answer the research questions under research objective 1, and to better understand research objective 2. Essentially, the models provide a framework to focus on what triggers migration, and what social processes are behind that decision. The aim is to understand when, and to what extent, vulnerability plays into such decisions. It is necessary to track individuals' progression in each of the models, and understand their context for decisions made, in order to analyze their experience in urban centers.

The purpose of research objective 1, and the above models, is to determine how vulnerability in the context of environmental disasters spawn migration. As the Nansen Initiative (2014c) indicates, vulnerability underlies the stresses people experience, and why they decide to leave their place of residence, just to survive in the face of environmental disasters. People often must leave their home to seek livelihood opportunities. Individuals who migrate are those most impacted, continually, by environmental disasters (Nansen Initiative, 2014c). Furthermore, migration occurs when disasters threaten physical safety of populations, but differs on whether it constitutes voluntary or forced migration (Krishnamurthy, 2012). However, disasters differ in terms of how they manifest, and consequently drive human beings to migrate. The most important to recognize is that migration constitutes a multi-causal dimension (Renaud et al., 2007). As Kolmannskog (2008) states,

No one factor, event or process, inevitably results in migration. This is not to downplay the importance of climate change and its effects. Although there is no direct causality between the environmental factor and forced migration, it is a relevant factor and a root cause. (p. 12)

Therefore, environmental factors themselves are not responsible for population movement (Krishnamurthy, 2012). The form of migration focused on in this research analyses the correlation between climate change and migration. Yet, climate change is never the sole force behind migration. Rather, the reason for migration constitutes a variety of factors, with climate change still a critical part in the overall equation. Multi-causality is a necessary aspect to understand both sudden-onset disasters and slow-onset disasters.

### **3.3. Voluntary and forced migration related to sudden-onset vs. slow-onset disasters**

Both sudden-onset and slow-onset disasters highlight the relationship between climate change and population movement; and act as a trigger event to spawn migration (Kälin & Schrepfer, 2012). However, both forms of disasters differ dramatically in how they manifest into environmental migration. In the case of sudden-onset disasters, migration, and particularly forced

migration, is easier to determine due to the nature of a *sudden* environmental disasters. Tracking and documenting migration is easier in relation to sudden-onset disasters (Nansen Initiative, 2014a). However, numerous other factors, such as poverty and additional institutionalized inequalities, still play a pivotal role in migration (Nansen Initiative, 2014a). Regarding slow-onset disasters, the Nansen Initiative (2014a) states that migration “arises as a consequence of a gradual erosion of resilience” (p. 12). Therefore, migration related to slow-onset disaster is far more difficult to recognize and track. It can be argued, too, that multiple small-scale sudden-onset disasters can compile into an overall slow-onset disaster (Nansen Initiative, 2014a).

Sudden-onset disaster constitutes events such as “flooding, windstorms (hurricanes/typhoons/cyclones) or mudslides caused by heavy rainfalls” (Kälin & Schrepfer, 2012, p. 13). Because of the relatively instantaneous nature of these events, the *trigger* related to migration lies in the disaster event itself. When sudden-onset disasters occur, people are either evacuated by authorities, leave areas of residence prior to the disaster event, or leave their residence after the disaster due to damaged homes, infrastructure, and services (Kälin & Schrepfer, 2012). The people who are *forced* to migrate in relation to sudden-onset disasters do so to save either their life or their family’s lives (Warner, 2010). Kolmannskog (2008) shows that movement from sudden-onset disasters is usually both short-distance and, generally, temporary. Those most impact by sudden-onset disasters are the vulnerable within society; often those who live in poverty (Kolmannskog, 2008). Sudden-onset disasters influence both voluntary and forced migration, while climate change intensifies the impact of such disasters.

Kolmannskog (2008) indicates that the frequency and severity of sudden-onset disasters will increase as a result of climate change. However, Kälin and Schrepfer (2012) take a different view on how climate change impacts sudden-onset disasters. They declare that no causal relationship exists between a warming planet and the changing of weather patterns, although disaster events themselves are climate-related. Kälin and Schrepfer (2012) believe that sudden-onset disasters would trigger migration regardless of climate change or not. Yet, Kälin & Schrepfer (2012) do indicate that climate change exacerbates migration patterns. They believe that “even where [sudden-onset disasters] are linked to climate change, such causality is difficult, if not impossible, to prove in a specific case” (Kälin & Schrepfer, 2012, p. 14). However, although difficulties exist in determining if climate change increases the frequency and intensity of sudden-onset disasters, the theory suggests sudden-onset disasters influence migration.

Specific migration patterns relate to sudden-onset disasters. For one, most people who migrate because of sudden-onset disasters remain within the borders of their country of origin, mainly due to the fact most individuals impacted are too poor to migrate abroad (Piguet, 2008 as cited in Kälin & Schrepfer, 2012; Krishnamurthy, 2012). Furthermore, migration is generally short-term. Although reconstruction efforts may ensue, most individuals return to their place of residence as soon as possible because homes and land remain somewhat habitable (Kälin & Schrepfer, 2012; Nansen Initiative, 2014a; Warner, 2010). Yet, the success of returnees depends on the effectiveness of recovery and reconstruction efforts (Kälin & Schrepfer, 2012; Warner, 2010). If recovery remains deprioritized, or insufficient, scores of migrants may remain away from their original place of residence for years, or even decades (Warner, 2010). Furthermore, if individuals impacted by sudden-onset disasters return to their place of origin, but cannot find work, they may be forced to migrate again due to deteriorating living conditions (Warner, 2010). Therefore, many factors play a role in how sudden-onset disasters effect and shape migration. Furthermore, as Kolmannskog (2008) states “the longer-term effects of sudden disasters, such as the loss of livelihood opportunities, can also trigger migration similar to [...] slow-onset disasters” (p. 15). Sudden-onset disasters only partially explain migration spawned from disasters.

Slow-onset disasters have potential to trigger both voluntary and forced migration as well. However, its scope has potential to far exceed sudden-onset disasters. As Kolmannskog (2008) states, “gradual environmental degradation can cause significantly more far-reaching and permanent migration than sudden disasters” (p. 25). Slow-onset disasters have the capability to trigger extensive migration within vulnerable communities.

Slow-onset disasters constitute events such as “rising sea levels, increased salinization of groundwater and soil, long term effects of recurrent flooding, thawing of permafrost, as well as droughts and desertification or other forms of reduced water resources” (Kälin & Schrepfer, 2012, p. 14). The events which fall under the category of slow-onset disaster generally comprise long time durations. Therefore, individuals who migrate due to “gradual environmental degradation are often less visible” (Kolmannskog, 2008, p. 5). This lack of visibility perpetuates the complexity of slow-onset disasters. To illustrate such complexity, and the nature of slow-onset disasters, Kälin and Schrepfer (2012) show,

Such deterioration may not necessarily cause displacement, but it may prompt people to consider migration as a way to adapt to the changing environment, and explain why people move to regions



with better living conditions and income opportunities. However, if areas become uninhabitable over time because of further deterioration, finally leading to complete desertification, permanent flooding of coastal zones or similar situations, population movements will amount to forced displacement and become permanent. Many factors will contribute to population movements in such situations including political, economic and social elements that may push people to move to other locations inside their own country or abroad [...] In other words, many factors, including the resilience of communities or the degree to which adaptation measures are taken and successful, will determine the degree of population movements in situations of drought, desertification and forms of environmental degradation. (p. 14-15)

The underlying cause of slow-onset disaster is a gradual change in climate. When changes occur, and at a certain point become constraints on income opportunities or wellbeing, it may lead migration, whether voluntary or forced. Just with sudden-onset disaster, a myriad of factors play a role in slow-onset disaster spawning migration. Slow-onset disasters exhibit a multi-causal dimension connected to individuals or families who migrate.

Crop yields and agricultural decline largely contribute to slow-onset disaster. In many studies over a wide range of regions and crops, the IPCC (2014) has high confidence that climate change impact on crop yields is more negative than positive. Especially in rural areas, the supply of food, and food security issues, arise when food production cycles differ from historic trends (IPCC, 2014). Consistent impact and the consequential degradation of crops fall under the category of slow-onset disasters.

Environmental conditions may deteriorate to the point where populations either voluntarily or forcefully migrate. Although complex in its multi-causal rationale, slow-onset disaster is likely the cause of most migration spawned from climate change. As the IPCC (2014) notes, small-scale disasters, which compound and create slow-onset disasters, particularly affect human communities. However, the difficulty in categorizing slow-onset disasters, especially the effort to determine how many humans migrate because of them, means research and literature surrounding such issues is limited (Piguet, 2008).

Slow-onset disasters are difficult to both predict and determine. Because slow-onset disasters are often more complex than sudden-onset disasters, it further complicates causality (Kolmannskog & Trebbi, 2010). Challenges exist to estimate migration patterns and whether migration is voluntary or forced in relation to slow-onset disasters because of the complex set of causes associated with such events (Kolmannskog & Trebbi, 2010). Due to the prolonged rate of change in slow-onset disasters, households have more time to decide on migration decisions, and

some family members may decide to migrate while others remain in the place of origin (Warner, 2010). Even more so, at different stages within certain environmentally or socially degrading trends, voluntary and forced migration may have blurred boundaries, and presides as the predominant form of migration at different times (Kolmannskog, 2008). As such, slow-onset disasters, and its associated migration, prove extremely difficult to designate.

Connecting slow-onset disasters and environmental hazards with climate change is particularly difficult as well. However, climate change certainly plays a part in slow-onset disaster severity. Slow-onset disasters will constitute the negative, long-term impacts of climate change (Kälin & Schrepfer, 2012). Slow-onset disasters and its associated environmental degradation are also expected to increase due to climate change (Kolmannskog, 2008). Climate change will increasingly play a role on how slow-onset disasters manifest, and particularly the impact they have on migration.

Both sudden-onset disasters and slow-onset disasters exhibit tendencies to spawn voluntary and forced migration. However, although each have that capability, numerous underlying processes and aspects determine migration. Furthermore, when individuals migrate through either voluntary or forced means, each type of disaster event will demonstrate different push factors to spawn migration, and pull factors to determine where and why migrants decide to move. A significant push factor explains that environmental disaster spawn migration (Lonergan, 1998 as cited in Piguet, 2008; Warner, 2010). Other push factors encompass social, political, and economic factors (Boano et al., 2008; Renaud et al., 2007). The main pull factor for migrants constitutes economic opportunities elsewhere, other than area of residence (Boano et al., 2008; Dun, 2011). However, difficulty exists to determine the scale of environmental push and economic pull factors related to this phenomenon (Black, 2001 as cited in Krishnamurthy, 2012). What is known, however, is that decisions to migrate and relocate elsewhere involve a combination of factors, as well as pressures, on individuals or families (Boano et al., 2008; Renaud et al., 2007).

### **3.4. Flooding as a driver of migration**

Flooding is a unique phenomenon because it has the possibility to fall under both a sudden-onset and a slow-onset disaster category. Therefore, whether floods fall under either sudden-onset disasters or slow-onset disasters, they have the capacity to initiate migration.

Abundant evidence demonstrates that river floods increase in quantity and intensity worldwide due to climate change (Docherty & Giannini, 2009; Krishnamurthy, 2012). As a result, Krishnamurthy (2012) indicates that within the last two decades, disaster events caused by flooding have increased by 300 percent worldwide. Coumou and Rahmstorf (2012) show that perceptions of *extreme* weather are based on past experiences; with climate change simply moving human society out of what is *familiar*. As global temperatures rise, extreme precipitation is expected because of an exacerbated hydrological cycle, already leading to increased flooding felt across all continents (Kreft et al., 2015).

Floods from increased precipitation directly impact human systems and reveal climate extremes, as well as the vulnerability that humans face (IPCC, 2014; Raleigh et al., 2008 as cited in Krishnamurthy, 2012). As such, food systems breakdown when exposed to repeated flooding (IPCC, 2014). Furthermore, as increased floods lead to crop damage, it also causes widespread damage to other infrastructure, livelihoods, and settlements across Asia (IPCC, 2014; Krishnamurthy, 2012). Rainfall also has potential to exacerbate short-duration floods (Wasko & Sharma, 2015 as cited in Kreft et al., 2015). Therefore, both sudden-onset disasters and slow-onset disasters can define flooding events, and its associated migration; it merely depends on the context of each specific flood.

Actual numbers of people expected to be impacted by increased flooding proves difficult to determine (EM-DAT, n.d. as cited in Piguet, 2008). However, certain trends can indicate how individuals may respond to flooding threats. Piguet (2008) demonstrates that most flood-impacted individuals return to disaster zones and reconstruct homes as soon as possible. All the while, increased vulnerability from flooding is expected to be a main driver of long-term migration (Kirsch-Wood et al., 2008).

Worldwide, rice production decreases because of climate change related precipitation and flooding (IPCC, 2014). Although subtle in appearance, recurrent degradation has a massive impact on loss of economic means, which may ultimately lead to migration; although the determinant on voluntary and forced migration differs in each situation. A case study by Dun (2011) within the Mekong Delta region of Vietnam show three-quarters of individuals surveyed state that floods linked to environmental problems played a role to influence movement at least one in their lifetimes.

### 3.5. Cyclones as a driver of migration

Unlike flooding, cyclones generally fall under the category of sudden-onset disasters due to the severity and frequency of their impact. However, if cyclones were to repeatedly strike an area, their nature would qualify as a slow-onset disaster. Furthermore, the largest determinant to whether a cyclone spawns migration, following either patterns of sudden-onset or slow-onset disasters, is the after effects of the cyclone. The IPCC (2014) has very high confidence that a climate-extreme such as a cyclone can wreak havoc on both the environment and humans. The IPCC (2014) states “impacts of such climate-related extremes include alteration of ecosystems, disruption of food production and water supply, damage to infrastructure and settlements, morbidity and mortality, and consequences for mental health and human well-being” (6). Especially if cyclones compound, the hardship humans face connected cyclones has potential to spawn migration.

Although certain outcomes and effects of cyclones are seen, the ability to attribute cyclones to climate change, especially the increase in intensity and frequency, poses challenges. In fact, no substantial evidence exists to indicate that climate change has impacted cyclones in any measurable way (Knutson et al., 2010; Walsh, 2004). However, that is not to say cyclones may *never* be impacted by climate change. It is inferred that given current weather patterns, the intensity of future cyclones may increase, although frequency is not expected to be impacted by climate change (Knutson et al., 2010; Walsh, 2004). With the phenomenon of climate change still in its infancy, however, factors such as sea-surface temperature and sea-level rise may in-fact influence cyclones in the future (Knutson et al., 2010).

Cyclones have potential to fall under the category of sudden-onset disasters, especially if they were to increase in intensity over time. Even more so, if cyclone events continually degrade individuals in a vulnerable state, they could qualify under slow-onset disaster. There is a myriad of possibilities to how cyclones could impact human beings. However, the largest determinate to whether cyclones spawn migration is the level of vulnerability an individual, household, or population poses when impacted.

### **3.6. Migration and relocation in urban centers**

Often, migrants have increased economic opportunities within cities, which appears attractive especially when poverty is intrinsic within lives (Crisp & Refstie, 2011; Lein, 2010; Black et al., 2011). As a result, individuals or families decide to relocate to urban centers in search of better lives (Warner, 2010). Migrants relocating to urban centers rely on personal networks, whenever possible, to root themselves in new places (Colson, 2016). Migrants move to cities for a variety of reasons; yet an influx of individuals in cities strain a variety of amenities, such as “jobs, housing, energy, clean water, food, transportation infrastructure, and social services” (Khaing, 2015, p. 13). However, many individuals relocate within cities unnoticed (Crisp & Refstie, 2011). Many migrants live next to the urban poor in cities, further stretching strained services (Crisp & Refstie, 2011; Black et al., 2011). Yet, as Khaing (2015) shows, cities can reduce poverty in both urban and rural settings because they “concentrate much of the national economic activity, government, trade and transportation, and provide crucial links with rural areas, between local, and across international borders” (p. 1). Cities have the potential to both benefit and detriment migrants.

Although migrants may decide to relocate in cities, they are often categorized in relation to their prior lives. Ngan and Chan (2013) explain that as newcomers, migrants are classified by city residence as ‘outsiders’. Furthermore, governments often classify migrants based off historical conditions, which include “ethnicity, race, class and gender” (Ngan & Chan, 2013, p. 319). If migrants fall within these criteria, they may feel ostracized in a city, without a sense of belongingness (Ngan & Chan, 2013; Castles, 2003). Castles (2003) demonstrates that ‘strangers’ and ‘others’ are usually seen as odd and dangerous by local communities. As the World Bank Group (2015a) highlights, cities must be inclusive for new residence to promote a sense of belonging for migrants.

However, migrants continue to face acute challenges in urban centers. Crisp and Refstie (2011) direct their research at forced migrants and asserts that such individuals face exceptional risks in urban centers. A major constraint felt by forced migrants within urban centers is “no secure housing, land, or property rights” (Crisp & Refstie, 2011, p. 2). However, challenges faced by forced migrants can also transfer to voluntary migrants as well. Essentially, urbanization has the capability to exacerbate and intensify inequalities in “access to services, employment, and housing” (World Bank Group, 2015a, p. 2). Such a situation leaves individuals “far from work,

schools, clinics, markets, and other amenities” (World Bank Group, 2015a, p. 2). Both voluntary and forced migrants suffer from inadequate recognition, but because of institutionalized social processes there is little they can do to alter their living condition.

Migrant exclusion from social processes within cities marginalizes them and degrades their recognition. Ngan and Chan (2013) show that many exclusionary policies have inherent factors of undervaluation of migrants’ contribution within society. Although migrants relocate in urban centers in many developing countries, where cheap labor is required for rapid economic growth, their work is frequently unrecognized within society’s social fabric (Ngan & Chan, 2013). Migrants often face continued hardship because of marginalizing perspectives from city residents.

### **3.7. Barriers faced by migrants in urban centers**

Migrants often face barriers accessing employment, housing, and education for their children within cities. Ngan and Chan (2013) show “state-enforced policies often construct social exclusions of disadvantaged migrant groups, reinforcing patterns of disparity within society” (p. 321). Marginalized migrants face inequality when dealing with labor protection, social service, and participation access, which highlights discrimination intrinsic within institutional structures (Ngan & Chan, 2013). Institutions which many migrants find unavailable include health services, employment, labor, housing and public assistance (Ngan and Chan, 2013). However, major constraints migrants face includes denial of labor and education for themselves or their children (Ngan & Chan, 2013). As Ngan and Chan (2013) state, such situations “affect quality of living and life chances” (p. 319), but also establishes “social divisions through institutional power” (p.320). The oppression of voluntary and forced migrants compounds their hardship within cities. As Ngan and Chan (2013) assert, social policies of migrants “tend to situate them in a relatively disadvantaged position” (p. 319). Fundamentally, the hardship migrants face adds to the difficulties to reduce their poverty within cities (Crisp & Refstie, 2011).

## **4. Methodology**

This thesis employed a qualitative research approach because it provided the means to research human vulnerability related to environmental disasters, migration patterns, and challenges migrants faced within urban centers. Qualitative research is concerned with perceptions of the social world, so therefore gives a deep understanding to the issues researched in this thesis (Bryman, 2012). Bryman (2012) states “the social world must be interpreted from the perspective of the people being studied” (p. 399). Qualitative research incorporated an *inductive approach* into this study. Therefore, findings related to the theories used in this thesis, and hopes to build upon them by generating novel data to contribute to the field (Bryman, 2012). Findings and existing theory combine to either accept or refute the current discussions related to the phenomena researched.

The qualitative approach was chosen because the phenomena of climate change impact on environmental disasters and migration involve multi-causality and layered complexity. Therefore, the necessity to understand participant perspectives through interviews was critical. Furthermore, the qualitative research approach allowed in-depth understanding of migrant’s access to employment, housing, and education for their children in urban centers. Qualitative research places the environmental hazards and forced migration studied in this thesis into broader frameworks of the concepts and theory used in the literature review. Thus, the topics researched in this thesis was best analyzed from a qualitative research angle.

This chapter reviews and outlines the qualitative research approach. To begin, an overview and justification of why the study areas in this thesis were chosen. Then, the process to select informant is reviewed. In the remainder of the chapter, each subsection explains and discusses a fundamental procedure of methodology: data collection, data analysis, limitations, and ethical considerations.

### **4.1. Selection of study area**

I observed and engaged in discussion with locals about the numerous environmental hazards which threaten both Myanmar and the people who reside there the first time I traveled to the country in 2012. Of the environmental threats prevalent in the country, different hazards affect varying parts of the country, and the people, in individualistic ways. This furthered my interest of Myanmar due the complexity and challenges such a situation presents. The correlates

to Kreft et al. (2015) who determines that Myanmar is the second most climate-vulnerable country in the world. From a holistic lens, Myanmar suffers a tirade of environmental hazards, which generates unique challenges to confront environmental disaster threats.

Through an internship and its associated research project in Spring, 2016, I focused on Myanmar and the issues of environmental hazards, displacement, and migration within the country. Through discussions and the tasks engaged with at the internship, the realization struck me that further research into the link between climate change, vulnerability, displacement, and migration was necessary. An awareness that environmental hazards trigger displacement and migration became a common discussion topic at my internship. Therefore, when I visited the organization's Myanmar Country Office in August, 2016, to discuss possibilities of collaborating for my research, the issues surrounding climate change-induced displacement and migration was both topical and relevant to issues occurring inside the country. During this time, I learned more about the 'on the ground' perspective of the phenomenon, and the knock-on effects of human decisions once environmental disasters occur. Furthermore, I learned that a lack of research existed on migrants' experiences within urban centers in Myanmar. Essentially, little research has manifested into the difficulties migrants continue facing after environmental disasters, and even less knowledge on their experience within urban centers. Therefore, the trend of rural-urban migration triggered by climate change, in the context of Myanmar, was an intriguing phenomenon to study.

And finally, through my continuous research of the country since my first visit in 2012, the unique contextual situation made me keen to choose Myanmar. From Myanmar's transition to democratic State, to increased foreign investment and economic growth inside the country, all the while faced with a growing population, illustrated that the issues, topic, and country research in this thesis would become ever more relevant. Furthermore, because the trends occurring in Myanmar have been, and continue to be, experienced elsewhere in the world, I aimed to learn about the situation in Myanmar to instill and enact on the items learnt throughout the rest of my life.



## 4.2. Selection of informants

### 4.2.1. Strategies

I aimed to interview a wide-spectrum of individuals to understand the phenomena researched from different viewpoints and understandings. An essential piece of my thesis is to understand vulnerability, and how it impacts individuals lives. Thus, to understand vulnerability, and how environmental hazards impact it, a diverse group of people were needed for interviews. It was critical to analyze which groups of people are impacted by environmental disasters, undertake migration, and understand different experiences within urban centers.

I employed a *non-probability purposive sampling* strategy. Essentially, I had to select individuals from my research areas strategically to ensure I answered my research questions (Bryman, 2012). However, it is important to note that since I used a non-probability purposive sampling strategy, I cannot generalize my findings to a larger population in the Ayeyarwady Delta, or to urban centers throughout Myanmar. Rather, the findings in this thesis correlate to the specific study areas within the Ayeyarwady Delta, Mawlamyine, and Yangon.

To conduct interviews, I used a *convenience sampling strategy* to find participants. In other words, I interviewed individuals that were simply available to me (Bryman, 2012). Although I sought interviewees which were available to me, I had to maintain a certain level of selectivity to ensure my research questions would be answered. In August, 2016, during my initial visit to Myanmar, I connected with a professor who I had contacted earlier that summer. This professor became my main contact for the thesis, and who assisted me throughout my whole research in Myanmar based on a verbal confirmation of “I will help you” the first time we met in Yangon. The professor was a critical to my research, as they coordinated logistics for all research sites visited in the Ayeyarwady Delta. When we selected research sites, we would travel directly there. When we arrived to a new village, the professor talked with the village head and village elders to pool individuals and coordinate interviewees. Therefore, convenience sampling derives from the fact we would arrive at a village, find interviewees relevant to the research questions, and interview such people. The same strategy was used in Mawlamyine and Yangon to find interviewees with my translator.

Furthermore, *snowball sampling* strategies played a critical role in my research. Essentially, in every research area, initial interviewees directed me to more individuals which were relevant to my research. As Bryman (2012) illustrates, snowball sampling is when a

researcher gets directed to further informants merely through the research process. When I met with people in the Ayeyarwady Delta, I asked about migration patterns to Yangon. This is how I learned of Hlaingtharyar Township, the industrial zone where numerous migrants from the Ayeyarwady Delta relocate. When I met with researchers in Yangon to talk more about migrants, we were able to narrow conversation based on previous information I received from interviewees in the Ayeyarwady Delta. When I met with migrants from the Ayeyarwady Delta in Yangon's Hlaingtharyar Township, the interviewees then directed me to further migrants who came from the Ayeyarwady Delta and other rural areas in Myanmar. The snowball was in constant motion, only growing larger with each interview I conducted.

Snowball sampling strategies were used entirely to meet with key informants. Both the professorial contact and my translator directed me to every key informant I interviewed. The professor directed me to academics in both Patheingyi and Yangon, where I talked with professors and researchers who focused on similar issues researched in this thesis. My translator, who has a large network within the Myanmar non-governmental organization (NGO) scene, directed me to key informants in the Ayeyarwady Delta, Mawlamyine, and Yangon. Furthermore, we met with my translator's friends often, who directed me to other key informants. I feel snowball sampling methods aligned closely with Myanmar culture. That is, since I was a guest, people went above-and-beyond to ensure I met with relevant and valuable contacts for my research. I was always directed to individuals I needed to meet with.

#### **4.2.2. Representation**

Initially, I aimed to conduct a total of 15 *in-depth, semi-structured informant interviews* within both the Ayeyarwady Delta and Yangon. However, in-depth interviews were difficult to coordinate in the field, and *focus group interviews* filled the void to ensure an adequate number of interviews were conducted.

There were specific traits I sought before interviewing respondents to ensure I had a varied field of representation and perspectives in my data (excluding key informants). It was critical that I gather a diverse, assorted mix of individuals for my research because certain lifestyles, attitudes, and experiences gathered differing feedback and understanding related to my research. Some categories of people had potential to be more affected than others in the face of environmental hazards, thus impacting their vulnerability. As such, I aimed to understand

differences in perceptions toward environmental disasters, levels of vulnerability, decision making processes, and migration patterns across different groups in society.

I target individuals who were young and old, land owners and landless, male and female, rich and poor, agriculture works and workers with other forms of employment, and individuals who have children and those without children. This is because Indra (1999) indicates that “experience differs with age, gender and other status characteristics as well as with the nature of resettlement” (as cited in Colson, 2003, p. 10). It was therefore necessary to interview a wide range of individuals, across the social-spectrum, to learn the nuanced ways they are impacted by environmental disasters and the decisions they make because of them.

At first, when in the Ayeyarwady Delta, it seemed that only male rice farmers were available to interview. If I felt that certain demographics of individuals had yet to be talked with, or one category outweighed another, I discussed with the professor about necessary changes for the next interview. When changes were made, different categories of people comprised my interviewees. In focus group interviews, there was generally a mix of individuals who possessed different character traits. For example, a rich, male landowner could have been in the same focus group as a female primary school teacher. I assumed this was going to be an issue, but it did not turn out to be one. Both interviewees would speak openly, agreeing if they did so, and disagreeing when they had different viewpoints. The only time I noticed slight hesitation within focus groups was between young and old, when the young would yield themselves to the older person. This amplified when the young individual was female, and the older one male. However, I recognized this very early, and directed questions at the female in such cases. That relieved the issue and I was conscious throughout the interviews to dismantle the barrier between such respondents.

Within the Ayeyarwady Delta, I asked respondents about their perceptions of life; alluding to important criteria such as employment, housing, and education. Then, once my urban center research began, I asked parallel questions to those in Mawlamyine and Yangon. This left the assessment of what constitutes *improvement* to me by comparing-and-contrasting interview answers in the Ayeyarwady Delta to those in Mawlamyine and Yangon. I built on the answers from the Ayeyarwady Delta by identifying areas of either positive or negative feelings, and then targeting follow-up questions in Mawlamyine and Yangon.

### 4.3. Data collection

A strong thesis relies on appropriate and sufficient data. Data collection methods were chosen on their relevance to answer my research questions, which was the most important item to consider for this study. In-depth interviews, focus group interviews, key informant interviews, questionnaires, observation, and secondary sources were all used to support the qualitative research process and answer my research questions.

#### 4.3.1. Interview techniques

I conducted a total of 36 qualitative interviews during my field research, all of which were recorded except 1. The interviews are broken down into: 13 in-depth informant interviews, 13 focus group interviews, and 10 key informant interviews (one not recorded due to request). See below for breakdown of interviews (Table 1):

Table 1: Breakdown of qualitative interviews in Myanmar  
(Mosberg, 2013 adapted by Michael Foster, 2017).

| <b>Types of qualitative interviews</b> |                               |                      |
|--|-------------------------------|----------------------|
| <b>In-depth Informant</b>              | <b>Focus group Interviews</b> | <b>Key informant</b> |
| 13                                     | 13                            | 10                   |

All 36 interviews conducted were *semi-structured*. Semi-structured interviews ensured the relevance to my research questions were met, but still allowed for flexibility in my interviews. The basis of this type of interview is an interview guide. As Bryman (2012) indicates, a list of topics is to be covered in an interview guide, but flexible enough to allow diversion from any set question list. Semi-structured interviews proved beneficial because, as the interviewer, I could ask questions not included in the interview guide when I felt necessary. This allowed me to expand on an interviewee's answer, or pursue a direction that was absent from the interview guide. However, I was always able to revert to my set list of questions on the interview guides when needed.

I developed four different interview guides to use in semi-structured interviews. Two were designed for the Ayeyarwady Delta and two for the urban centers of Mawlamyine and Yangon. The interview guides were designed to linearly address the research questions under the

two research objectives. Furthermore, depending on the interview, I could jump to different sections of the interview guide used during that specific interview. The interview guide used in the Ayeyarwady Delta followed the research questions under research objective 1, and the urban settings interview guide for research objective 2. Each interview guide can be found in the appendices. They are as follows: Ayeyarwady Delta in-depth and focus group interviews (Appendix 1), Ayeyarwady Delta key informant interviews (Appendix 2), Yangon Region and Mon State in-depth and focus group interviews (Appendix 5), and Yangon Region and Mon State Center key informant interviews (Appendix 6).

For all my interviews, I used a digital recording device; except one when the interviewee refused recording. I recorded a total of 35 interviews from my field work. In all 35 interviews the respondents gave permission to record the interviews. All interviewees were comfortable with the voice recorder. The tape recorder was extremely useful as I was unable to write the interviews word-for-word. I always took notes during my interviews and it proved useful as I could reference, incorporate, and emphasize the key points before future interviews.

I used a translator in every single interview except one key informant interview. The translator had plentiful experience with translating before we met. Therefore, they were a fantastic translator who also gave insight on my interview guides and areas of potential confusion for interviewees. I did, however, use two other translators during my field-visits to Thabaung Township, since the initial translator was not available the dates I conducted research. Those translators were local students and due to their limited translating exposure, I felt constrained at times during interviews in Thabaung Township. At times, my professorial contact helped with translations as well, especially in Thabaung Township and a few key informant interviews. Every translator except the professor was a male. I never felt this detrimental to my interviews based on gender norms or constraints. Although some women were shy to interview at first, once they were selected and agreed to an interview, they always spoke their mind.

### 4.3.2. In-depth informants

Table 2: Breakdown of in-depth interviews by research location  
(Mosberg, 2013 adapted by Michael Foster, 2017).

| <b>In-depth informant interviews in Myanmar</b> |                          |                      |                               |
|---|--------------------------|----------------------|-------------------------------|
| <b>Ayeyarwady Delta</b>                         |                          | <b>Urban Centers</b> |                               |
| <b>Laputta Township</b>                         | <b>Thabaung Township</b> | <b>Mawlamyine</b>    | <b>Hlaingtharyar Township</b> |
| 2   | 0                        | 2                    | 9                             |

I initially planned to conduct all interviews throughout my fieldwork as *in-depth informant, one-on-one* interviews. However, when in the field, in-depth interviews proved difficult to conduct. When I arrived to new villages, masses of people appeared to listen, participate, and express their opinions during interviews. It seemed that an ‘outsider’ in their village, especially a foreigner, attracted much curiosity. Interestingly, although I was unable to conduct any in-depth informant interviews within the Ayeyarwady Delta, I had success in Mawlamyine and Yangon. This was due to the availability of conducting interviews in secluded spaces within urban centers, with communities far more disjointed than in villages. In the Ayeyarwady Delta, the communities I interacted with were extremely tight-knit. Therefore, it was easier to talk and conduct in-depth, one-on-one interviews with people in urban centers.

Whenever I had the choice though, I opted for in-depth interviews versus focus group interviews. This had to do with my initial ambition to conduct in-depth interviews, so I tried to adhere with my original research design. Even more so, I felt that in-depth interviews allowed me to probe deeper into an individual’s perspective about the phenomenon being researched. I felt that certain issues, especially personal choices or perspectives, could be better understood from in-depth interviews.

A detriment to the in-depth interviews I conducted in Hlaingtharyar Township, however, lies in the fact that for most of my interviews, governmental authority accompanied my translator and me to interviews. Thus, when I interviewed a respondent, usually alone in a flat, or surrounded by other distant community members, a village tract or village government official would be near. For the most part, I felt the presence of authority did little to hinder interviewees

responses (sometimes, in fact, the governmental employee shared their passionate, similarly shared viewpoint to that of the interviewee). I believe this governmental presence had the largest impact on interviewee comfort and openness, especially because many of those we interviewed were migrants who wanted to avoid unnecessary attention from authority. Out of 13 in-depth interviews, 9 interviews consisted of female respondents. Thus, when I interviewed females, and governmental authority was present while their husbands or sons worked, I felt they hesitated to share complete thought-processes with me. I felt no authority, power, or grounds to ask the governmental official to remove themselves from the situation.

### 4.3.3. Focus groups

Table 3: Breakdown of focus group interviews by research location  
(Mosberg, 2013 adapted by Michael Foster, 2017).

| <b>Focus group interviews in Myanmar</b> |                          |                      |                               |
|--|--------------------------|----------------------|-------------------------------|
| <b>Ayeyarwady Delta</b>                  |                          | <b>Urban Centers</b> |                               |
| <b>Laputta Township</b>                  | <b>Thabaung Township</b> | <b>Mawlamyine</b>    | <b>Hlaingtharyar Township</b> |
| 1  | 9                        | 0                    | 3                             |

The inability to conduct in-depth informant interviews, mainly in the Ayeyarwady Delta, led to *focus group interviews* becoming the main form of interview practiced during data collection. A focus group is an interview technique which involves more than one interviewee, generally more than four (Bryman, 2012). Focus group interviews also took place in Hlaingtharyar under similar parameters of when too many people were present to conduct in-depth interviews. Given the nature of my research, many people wanted to involve their opinions in my interviews. When a location to conduct the interview was chosen, usually a local home, people would cram into the space to listen-in on the interviews. Before an interview began both my professorial contact, translator, and myself indicated who would consist of the respondents for the particular interview. However, shortly after the interview began, my focus group size would swell with individuals who responded to questions.

Although frustrating at times, I fundamentally believe this to be a positive aspect of my interview process. All people present understood there was still a 'core' group of respondents which were picked for the interview at the outset. Therefore, when individuals outside of the 'core' would insert themselves into the interview, they reaffirmed notions of passion, either agreeing with each other, or criticizing and contradicting each other. In other words, this method of *ad hoc* interviewee participation acted as a form of checks-and-balances to the already fixed focus group.

A negative aspect of this situation was the fact I had not gathered introductory information about those *ad hoc* participants. Therefore, unless specifically asked during the interview (which I would do if they became a more permanent member of the focus group), I would not learn their age, occupation, education status, and other foundational information. Although unfortunate regarding the lack of information on them, I believe these individuals added value to my focus groups; and also added positive energy to the overall interview since it appeared they had strong and respected personalities within the village networks.

Furthermore, an initial concern with people moving in-and-out of the conversation was that it would detract from the interviewees chosen at the outset. Yet, I learned quickly that especially in villages, people have no restraint to speak their mind. Especially with men and women in the same focus group, each would participate equally. The issue between young and old participants arose in focus groups, but after intervention, even a younger person would speak their mind; and it was possible they could have contradictory viewpoints from the older individual without any animosity instilled on them from the other focus group participants.

Therefore, the numbers of my focus group interviews fluctuated, but I would have anywhere from 4 to 15 people participate in the interview. Although 15 people sounds like a large group of individuals for a focus group interview, the focus group would generally consist of five to eight core individuals responding, with the others mostly listening in and irregularly contributing when they felt the desire. In one specific case during the focus group interview in Sin Lan Village Tract, Thabaung Township, I conducted an interview with a crowd of 35 people in-front of me. This was quite a hectic scenario, but I convened with my translator to ensure only eight people would answer my questions. The crowd respected this request, but in times of intense passion, everyone would break out, in unison, to support or refute the inquest made at that



time. Therefore, I rarely had logistical issues with focus groups interviews, even with seemingly large crowds.

#### 4.3.4. Key informants

Table 4: Breakdown of key informant interviews by research location  
(Mosberg, 2013 adapted by Michael Foster, 2017).

| <b>Key informant interviews in Myanmar</b> |                          |                |                               |                               |               |
|--|--------------------------|----------------|-------------------------------|-------------------------------|---------------|
| <b>Ayeyarwady Delta</b>                    |                          |                | <b>Urban Centers</b>          |                               |               |
| <b>Laputta Township</b>                    | <b>Thabaung Township</b> | <b>Pathein</b> | <b>Mawlamyine (Chaungzon)</b> | <b>Hlaingtharyar Township</b> | <b>Yangon</b> |
| 3  | 1                        | 1              | 1                             | 2                             | 2             |

The key informants interviewed consisted of village elders, community leaders, NGO workers, governmental officers, university professors, and civil society leaders. These interviewees were critical to my research because they provided deep insight into the phenomena researched, from different angles compared to other interviewees (Bryman, 2012).

I would have liked to interview more key informants, but given structural constrains, I was unable. For example, at times when I approached government officials to interview, they were reluctant to talk with me. Unfortunately, I could have met with high-caliber key informants in Myanmar’s capital Nay Pyi Taw, but these connections were made at the end of my stay in the country. Simply, my time in the country ran out, and I was unable to meet with the officials.

I tried to gather as many key informant interviewees as possible, but it still fell below the 15 key informant mark I strove for. In the end, I conducted 10 key informant interviews. However, I cannot understate the value my key informants brought to this thesis. They each contributed remarkable insight and different viewpoints compared to other informants.

#### 4.3.5. Questionnaires

I employed questionnaires as a form of research method to support my qualitative research. Questionnaires are a compiled list of questions distributed to participants (Bryman, 2012). Although my questionnaires inherently involve numbers (from respondents who answered the questionnaires), I used the results to construct a version of the social world related to the phenomena researched. I devised my questionnaires to provide further and valuable evidence for this thesis.

Initially, I planned to distribute questionnaires prior to any interview, in order to select my interviewees from the population who completed the questionnaires. Due to the nature of village life within the Ayeyarwady Delta, and the fact I was dependent on convenience sampling from village-to-village, I learned my questionnaire ambition was implausible. Given time constraints, the originally-planned sampling strategy to distribute questionnaires before interviews was unfeasible due to limited time in each village. Therefore, I had to adapt my questionnaires to still collect relevant data for my thesis.

Therefore, I distributed questionnaires *in parallel* to my interviews. Whenever I arrived to a new village I distributed questionnaires to any willing participants, in order to assess the perceptions of that particular village in relation to the issues researched. Often, I would have numerous people who wanted to take the questionnaire, so I made sure a diverse group of people were selected to complete the questionnaire. The different categories entailed: young and old, land owners and landless, male and female, rich and poor, agriculture works and workers with other forms of employment, and individuals who have children and no children; the same criteria used for interviewee sampling. I ensured that no one involved in a focus group or in-depth interview completing the survey, to avoid respondent overlap on data collected. As there was always much commotion around me, I believe there may have been a few overlaps in interviewee and questionnaire responses. However, I worked to the best of my ability to prevent this from happening.

I formulated two separate questionnaires; one for the Ayeyarwady Delta (Appendix 3) and one for Hlaingtharyar Township (Appendix 7). Both had to be translated before distributing to respondents (Appendix 4 for Ayeyarwady Delta translation and Appendix 8 for Hlaingtharyar translation). I distributed a total of 71 questionnaires in the Ayeyarwady Delta, with 66

completed. In Yangon, I distributed 24 questionnaires and received 22 completed questionnaires back. I was unable to distribute questionnaires in Mawlamyine.

A major difficulty I experienced was equal distribution of questionnaires between research sites. In some villages, I would arrive and there would be ample people to distribute questionnaires to. However, in other villages I was unable to find enough individuals to adequately distribute questionnaires, unless I distributed to multiple members of the same family. Therefore, I only decided to distribute questionnaires when I had a sufficient amount, and a diverse group, of people to receive feedback from. I attempted to distribute between seven to nine questionnaires in all research locations.

At the end of each field research day, I transferred the questionnaire data to an Excel spreadsheet. Since the questionnaires were in Burmese, I had to translate the write-in questions with my translator. I knew the format of the questionnaires, so it was an easy process to transfer the data to Excel once I translated the necessary sections. I developed a coding system in Excel, whereby I marked “Yes” answers “1”, “No” answers “2”, and “I have no children” answers “3”. The purpose of this was to make it easier to calculate and analyze the data in Excel. I then calculated each question between and against other villages, regions, and different categories of people. I aimed to research if perspectives from my different research areas correlated with each other or contradicted each other.

The questionnaires provided empirical evidence for my research. The purposes of the questionnaires are instrumental in my research as they provided a technique to collect relevant data to support the research objectives and research questions. Although two different questionnaires were employed during my research, I attempted to link and create similarities between the two, so they supported each other just as my research objectives did.

#### **4.3.6. Observations**

Through observations I better understood the themes related to this thesis; such as the impact of environmental disasters and vulnerability in the Ayeyarwady Delta and the hardship within urban centers. As Emerson, Fretz, and Shaw (2011) indicate, observations are a way to understand and interpret social worlds. Therefore, throughout my research I strove to understand how environmental disasters impact migration patterns. My research focus aimed to understand different categories of people and their connection to vulnerability. Through observations, I

wanted to better decipher how interviewees interacted with their natural world and how they perceived their setting. Thus, observation turned into an indispensable method for my research.

An impactful aspect of my observations was the connection to the environment around me. In the Ayeyarwady Delta I was surrounded by rice paddies, in an area ‘as flat as a pancake’, but all the while researching environmental disasters. Therefore, the indications of how ravishing environmental disasters such as floods can be, and how humans must adapt to their environment, was apparent.

Observations allow the routines and daily life situations of the people researched to come to the forefront, while their hardships, pressures, and overall life was contextually understood (Emerson et al., 2011). Similar aspects were observed within urban centres. Because of my research questions, I analysed whether migrants’ lives improved or declined in Mawlamyine and Yangon. I took themes from the Ayeyarwady Delta and contrasted it to not only what they said in interviews, but also what I personally observed. I never drew conclusions from pure observations, but always connected it to interviews, questionnaires, and theory.

I incorporated observations into this thesis to gather insightful data, and support data collected through other research methods. Such a method correlates to triangulation, as this form of research merely contributed to the overall research process to ensure adequate research methods and data collection. As Emerson et al. (2011) highlights, researchers who incorporate observations into research seek to understand the world of participants better.

#### **4.3.7. Secondary sources**

Secondary sources assisted to understand the themes dealt with in my research objectives and research questions. Before my fieldwork, throughout the thesis-development phase, there was much contemplation of how to professionally and academically point to climate change as a driver of climate variability and migration patterns. My research relied heavily on peoples’ perceptions and perspectives, but the element of secondary sources was necessary to connect the findings to theories. Secondary sources were used to root myself in the context, theories, and discussion of climate change, climate variability, different forms of migration, and issues facing migrants in urban centers.

Prior to fieldwork, I collected and analyzed secondary sources to root myself in theory. The theory helped produce my introduction, background and theoretical framework chapters. The

literature review provides the basis of the theories discussed in this thesis, and then compares those theories to my research findings. The literature review was a crucial and necessary part of this thesis.

Secondary sources assisted to define and understand concepts such as *forced migration*, *voluntary migration*, *slow-onset disasters*, *sudden-onset disasters*, and trends associated with population growth in *urban centers*. I used secondary sources to compare-and-contrast interviewee perceptions against defined definitions. Review of secondary sources was necessary as climate change connected to migration patterns was a cornerstone of my research.

I attempted to collect secondary sources in Myanmar, but major constraints existed related to acquiring the sources. Foremost, a lack of data exists on weather and migration statistics in the country. In Myanmar, whenever I probed contacts about secondary sources related to my research, a common response was that such sources did not exist. If empirical data in fact did exist, it was an extremely lengthy process of bureaucracy and ‘red-tape’ to acquire the data from government officials. Major hurdles existed when a foreigner comes to inquire about secondary sources at a local administration office. Even more so, if data did exist, and officials were willing to provide it, the data was likely in Burmese.

However, I did manage to collect a handful of maps and population statistics from contacts in Myanmar. Regarding these secondary sources, at first I was weary to use them because I could not trace the references back to the original source. I attempted to recover as much detail regarding references from the contact who provided me with the information to sufficiently and adequately ensure the source was given appropriate recognition, and to uphold proper academic standards. The data from these references represents what was presented in the documents, acquired from contacts while in Myanmar.

#### **4.4. Data analysis**

I transcribed all interviews in which I conducted (and transferred the notes of the one interview which I could not record). When I transcribed, I typed the interviews in the same document with my field notes I took during interviews. All interviews had to be transcribed after fieldwork. I was unable to transcribe any interviews during my time in Myanmar due to noisy surroundings and insufficient work areas. However, during interviews in Myanmar I was very familiar with my research questions so I could ‘code’ throughout my interviews. Whenever an

interviewee responded with information which pertained to a research question, I would explicitly mark it in my interview notes. Therefore, before I even began to transcribe my interviews, I had an idea of a coding scheme, and what information fell under such topics.

I broke the process of analysis into two different sections, separated into research objective 1 and research objective 2. I would take the information transcribed from each research objective, read in secondary sources, or from the questionnaires and file it under necessary categories in a designated Microsoft Word documents. Under research objective 1, I used my analytical framework, both the PAR and Access Model, to analyze my data. I separated data into the main areas of *root causes*, *dynamic pressures*, and *unsafe conditions*. As the PAR Model tracked macro-level issues related to vulnerability, the Access Model better portrayed micro-level issues such as livelihoods and adaptation strategies, which I used as a coding scheme. The analytical frameworks helped categorize the abundance of information I gather from field research, by transferring data into perceivable and workable categories.

I developed and employed a coding sequence which categorized interviewees responses into applicable areas to support research objective 2 and the research questions underneath it. The coding sequence consisted of *employment*, *education*, and *housing* areas. These were the main pillars to which my research objective 2 orbited. I further broke down each area into *access* and *no-access*, plus *improvement* and *decline*.

The questionnaires required their own data analysis scheme. I calculated values of each question in relation to the total population interviewed. I delved into further depth by sorting categories of gender, age, and profession against each other. Multiple types of calculations were run, with the results documented in Excel. I sorted the questionnaire answers using an Excel spreadsheet to mark and file the data in a concrete, observable way.

Throughout the whole duration of my research, whether collecting data from secondary sources before field work, to field notes in Myanmar, transcribing after field work, and sorting questionnaire responses, I employed a color-coding scheme related to pre-determined themes and categories. I used an array of colors to separate background and theory, categories from the analytical framework, as well as categories designed for my research questions. I then compiled specific colors into overall themes, and used those themes to outline my findings sections. The use of colors ensured that appropriate and relevant data was put towards answering my research questions.

The most important aspect to my data analysis is the issue of *trustworthiness*. As Bryman (2012) indicates, the analysis must be trustworthy, and therefore must include the criteria *credibility, transferability, dependability, and confirmability*. The main reason for such a focus is to avoid assumptions. If all elements are inherently linked to the data analysis, it helps to elevate the trustworthiness of my analysis, and therefore the overall study.

*Triangulation* is intertwined into the concept of *trustworthiness*, and thus played a critical role in my research. Historically, triangulation refers to mixed-method research between quantitative and qualitative research (Bryman, 2012). However, all research methods used in this thesis related to qualitative research, while the study incorporated more than one research method to collect data. As Bryman (2012) shows, triangulation refers to a research process which incorporates more than just one method of data collection. Such a strenuous process cross-checks data and improves the *validity* and *reliability* of the research conducted. The purpose of devising a study which incorporated multiple research methods was to promote triangulation, and warrant that I collected sufficient data. Furthermore, triangulation was crucial to ensure my interpretation of the data was valid (Bryman, 2012).

#### **4.5. Limitations**

Local government authority created a limitation throughout my research. Whenever I arrived at a new research site, I had to check-in and register with authority at village levels. This meant that I handed over a copy of my passport, visa, and NMBU support letter, while also marking myself 'in' and 'out' at new villages. For the most part, this aspect was not a major hindrance for my research. However, this came to be a problem when I wanted to expand my research sites, and severely limited my research scope in Hlaingtharyar Township. I tried to check-in with village tract authorities in Hlaingtharyar Township, and they denied my access to the area. I then attempted with township-level authorities, where I was further denied access. The Township authorities insisted I take my request to a regional level, which due to the independent nature of my research and limited time in the country, was unfeasible. Therefore, I was unable to collect data which would have been a tremendous contribution to my research.

My timeframe in Myanmar morphed into a constraint for my research as well. Since I depended on numerous actors, logistics and coordinating research always took longer than expected. Furthermore, if I had more time in the country, I would have swapped the process of

conducting research. Essentially, I would have begun research in Mawlamyine and Yangon (and possibly other urban centers), then traced migrants back to the Ayeyarwady Delta or other areas in Myanmar. This would have required far more time, in part to organize governmental approval for certain areas in Myanmar, which I did not have.

Part of the time constraint intertwines with my financial constraints. I received a financial stipend from NMBU, which was a huge help, but only covered a fraction of my airline ticket to Myanmar. Therefore, throughout my research in Myanmar, all expenses came from personal finances. I lived cheap because I have little money to my name (now almost none). If I had more expendable cash, I could have sped up the research processes through personal transportation, access to authority which grants travel permission, and adequate accommodation in research sites. But, due to my financial situation, I always chose the cheapest financial option.

I also found the lack of secondary sources frustrating throughout the thesis research. I believed it important to connect peoples' claims to secondary sources, but there existed a lack of data in connection to the issues being researched in this study. Furthermore, when I did find documents, many times names of locations and population numbers did not correlate to other documents. The process to decipher and understand these documents was exhausting. Therefore, if I did find documents, the issue of how to assess the reliability of them was a constant factor.

Throughout my whole research process, my translator was extremely reliable. However, when I conducted research in Thabaung Township, they were unavailable for translation services. I then enlisted two friends, one for each research day, to help with interviews. They were both students at Patheingyi University, with high levels of English proficiency. Yet, their experience translating was minimal. Throughout the interviews there was ample confusion; from the translators, interviewees, and myself. We had to go back-and-forth, during the actual interview, to clarify confusion between English-Burmese translation. Furthermore, I noticed at times the interviewee would state a lengthy response, but then the translation to me would be quite short. I had to probe for follow-up constantly, and it became frustrating, to say the least. However, my friends helped me out of the kindness of their heart, for which I was extremely grateful. Without them, no interviews could have taken place, so it made data collection possible.

Lastly, the gender dimension of my research. My translator was, and the two substitute translators were, male. At first I had major concern if this would be an issue. However, it was not as Myanmar culture is fairly gender equal. I did observe, early in my interviewing process, that



men outnumbered women. Therefore, I made a change to incorporate more women into my research, and it resolved that issue. The only time I noticed the gender dimension being an issue within my research was when young women were in the same focus group as older men. The women would yield their response to the men. However, I directed more questions to the female and when I did the woman would speak her mind. Therefore, it just required a little navigation to break those minimal gender boundaries. Overall, though, gender imbalance did not play a factor in my research.

#### **4.6. Ethical considerations**

Ethical considerations are of the utmost importance in social research. As I undertook the role of a researcher in Myanmar, it was extremely important to uphold ethical principles throughout the duration of my study. Social research has the capability to harm participants, which by all ethical guidelines is unacceptable (Bryman, 2012). Therefore, it was critical that I was aware of ethical principles throughout my research to minimize the potential impact on participants. Ethical principles include the concepts of ‘do no harm’ to participants, informed consent, the conscious handling of data, and truthful data-discussion (Molteberg, PowerPoint presentation, 2015).

An essential aspect of ethical consideration, and one employed throughout my research, was the concept of ‘*do no harm*’. Do no harm ensures that the participants involved in research avoid being physically and mentally deceived and endangered (Bryman, 2012; Molteberg, PowerPoint presentation, 2015). Before research began in Myanmar, I understood the themes researched in this thesis would lead to individuals who experience hardship, and pushed to the fringes of society in some cases. I had to consider sensitive information discussed as to avoid unintended consequences for the people interviewed.

For example, in the final day of fieldwork in Hlaingtharyar Township, I desired to visit Yeokkan Village Tract, located directly inside an industrial zone. Both my translator and I received information that an extensive slum-area existed there. We drove to the village tract administration office, which we always visited to gain permission to work inside the administration visited. We were denied access to the slums and told to visit the township administration office. For some time we grappled with defying the local administration and conduct research without permission. I refrained due to the possibility on what repercussions

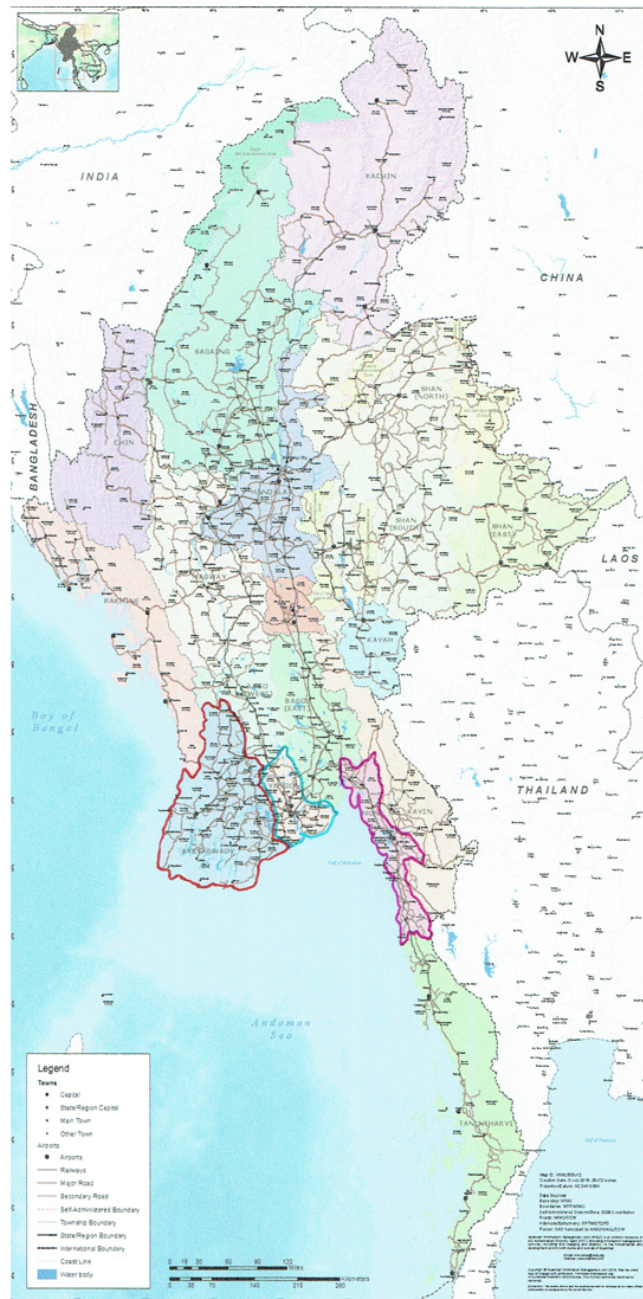
could occur to the people we interviewed if the local administration learned about our disregard. I understood the respondents and interviewees could have been put in grave jeopardy, especially because it was possible they resided in the village tract unregistered. The concept of ‘do no harm’ stuck out in my mind, and I had to foremost think about the participants, since their wellbeing took precedence over anything else in my research.

*Informed consent* entails that participants receive full and accurate information regarding the research they participate in (Bryman, 2012). Before interviews, whether in-depth, focus group, or key informant interviews, I always gained consent from the interviewee that I could use their information in my research. Such consent included my research topics and aims of the research. Furthermore, I guaranteed that they would remain completely anonymous in relation to all information they provided. It was emphasized that interviewees could pass over any question they did not want to answer. The process of informed consent became a routine where my translator could transfer the information accordingly. Upon meeting participants, I explained who I was, what my research entailed, what my study program was, and answered any other questions they had about me.

Another ethical principle consists of *confidentiality*. Confidentiality relates to the storage of data records, secure transportation, and the termination of data after use (Molteberg, PowerPoint presentation, 2015). To ensure the safety of collected data meant that I did not share information with anyone, as promised to the participants. However, it must be said that there are ‘grey-areas’ in this regard, as I was with my translator at all times and they overheard, and in fact directed, each interview. We discussed this issue, and they provided verbal consent that all information discussed would remain anonymous. Furthermore, the aspect of data storage throughout all my data collection was important to consider. I abided by NMBU’s ethical guidelines, which incorporate data collection considerations in it. Safe storage and safe transportation were imperative and privacy of the interviewee was a necessity.

## 5. Study areas

This chapter introduces and contextualizes the study areas from the field research. Within my research, I conducted fieldwork in the Ayeyarwady Region, Mon State, and Yangon Region between 5 January and 16 February, 2017 (Map 2).



Map 2. Myanmar with Ayeyarwady Region (outlined in red), Yangon Region (outlined in blue), and Mon State (outlined in purple). Map: Myanmar Information Management Unit (2016a) modified by Michael Foster (2017).

## 5.1. Ayeyarwady Delta

The Ayeyarwady Region consist of 35,031.88km<sup>2</sup> total land area (DPMIP, 2015). The capital of Ayeyarwady Region, Patheingyi, sits in the West of the Region, on the Patheingyi River (sometimes called Ngawun River). The Patheingyi River is one of nine-arms constituting the delta area of the Ayeyarwady River, which forms the boundaries of the Region. I spent three weeks based out of Patheingyi between 8 January and 28 January, 2017, with two field excursions to Laputta Township and Thabaung Township (Map 3).



Map 3. Ayeyarwady Region with Laputta Township (purple highlight) and Thabaung Township (green highlight). Map: Myanmar Information Management Unit (2016b) modified by Michael Foster (2017).

To collect relevant data for research objective 1, I chose the river delta in Myanmar, the Ayeyarwady Delta as my study location. This decision was based on the fact that the Ayeyarwady Delta continuously experiences flooding, cyclones, as well as numerous other disaster events (Nansen Initiative, 2014c; MCCA, 2016; DMHMT, 2012; Simmance, 2013). Furthermore, as evident from other river deltas in the Asian region, numerous environmental disasters continually impact humans in delta areas (Olli et al., 2012). In the case of Myanmar, the Ayeyarwady Delta has historically experienced numerous environmental disasters. The Ayeyarwady Delta experiences regular cyclone impact, although such cyclones are smaller in scope compared to Cyclone Nargis (Nansen Initiative, 2014c). Furthermore, the Ayeyarwady Delta experienced severe floods in 2011, 2013, and 2015, and smaller flooding events in 2012 and 2016 (reliefweb, 2017; Japan International Cooperation Agency, 2015). The contemporary, and historical, impact of environmental disasters on human communities lead to significant numbers displaced or migrating away from the Ayeyarwady Delta (reliefweb, 2017; MCCA, 2016). An overall danger of environmental variability exists in the Ayeyarwady Delta, which determined its selection as the research site for my research objective 1.

Furthermore, the urban-rural population distribution in the Ayeyarwady Delta was a reason it was selected for research. From the delta's total population of 6,184,829 people, 86 percent (5,312,229 people) live in rural areas (DPMIP, 2015). The rural population is the highest percentage of any State or Region within Myanmar (DPMIP, 2015).

When observing population trends, the Ayeyarwady Region has experienced a decrease in Myanmar's population percentage. In absolute terms, the Ayeyarwady Region's population has increased from 4,156,673 people in 1973 to 6,184,829 people in 2014 (DPMIP, 2015). However, in relative terms, in 1973 the Ayeyarwady Region had 14.4 percent of Myanmar's total population, while in 2014 it was 12.0 percent (DPMIP, 2015). Most inhabitants within the Ayeyarwady Delta rely on agriculture for livelihood (Burma Rivers Network, 2016; MCCA, 2016; DMHMT, 2012). Due to reliance on agriculture, inhabitants usually live in poverty (DMHMT, 2012; Simmance, 2013; UNDP, 2017). If the rate of poverty increases in the Ayeyarwady Delta, it could correlate with a trend to move away from the area.

### **5.1.1. Laputta Township**

Laputta Township, my first research site, consisted of a three-day field research excursion between 14 and 16 January, 2017. Laputta Township is located in the Southern Ayeyarwady Region. The area is susceptible to numerous environmental hazards including sea level rise, flooding, rainfall, temperature fluctuation, and cyclones; with flooding and cyclones particularly impactful on Laputta Township (Fee et al., 2017). Because of the township's peculiar position at the most Southern edge of the Ayeyarwady Delta, environmental hazards can have devastating impacts on local communities.

The DPMIP (2014) gives a population of 229,929 in Laputta Township. Laputta has 86.44 percent of the population, or 198,755 persons, living in rural areas (DPMIP, 2014). The township's important livelihood activities are rice cultivation, shellfish aquaculture, and fresh and saltwater fisheries (Fee et al., 2017). Laputta Township was directly hit by Cyclone Nargis in 2008, which left the area devastated. Because the people in Laputta relied on (and currently do) agriculture for means of livelihood, Cyclone Nargis left many people in a furthered vulnerable state due to destroyed agricultural crops (Webster, 2008).

During my time in Laputta, two village tracts were visited, consisting of four village visits (Map 4). The first village tract, where three villages were visited, was Thin Gan Gyi and consisted of two in-depth informant interviews and three key informant interviews. The second village was Laputta Village Tract and consisted of one focus group interview. The village in Laputta Village Tract was outside the urban area where a relocation camp for Cyclone Nargis survivors was built by the government. The locations visited were chosen based off the present and historical experience with disaster events.





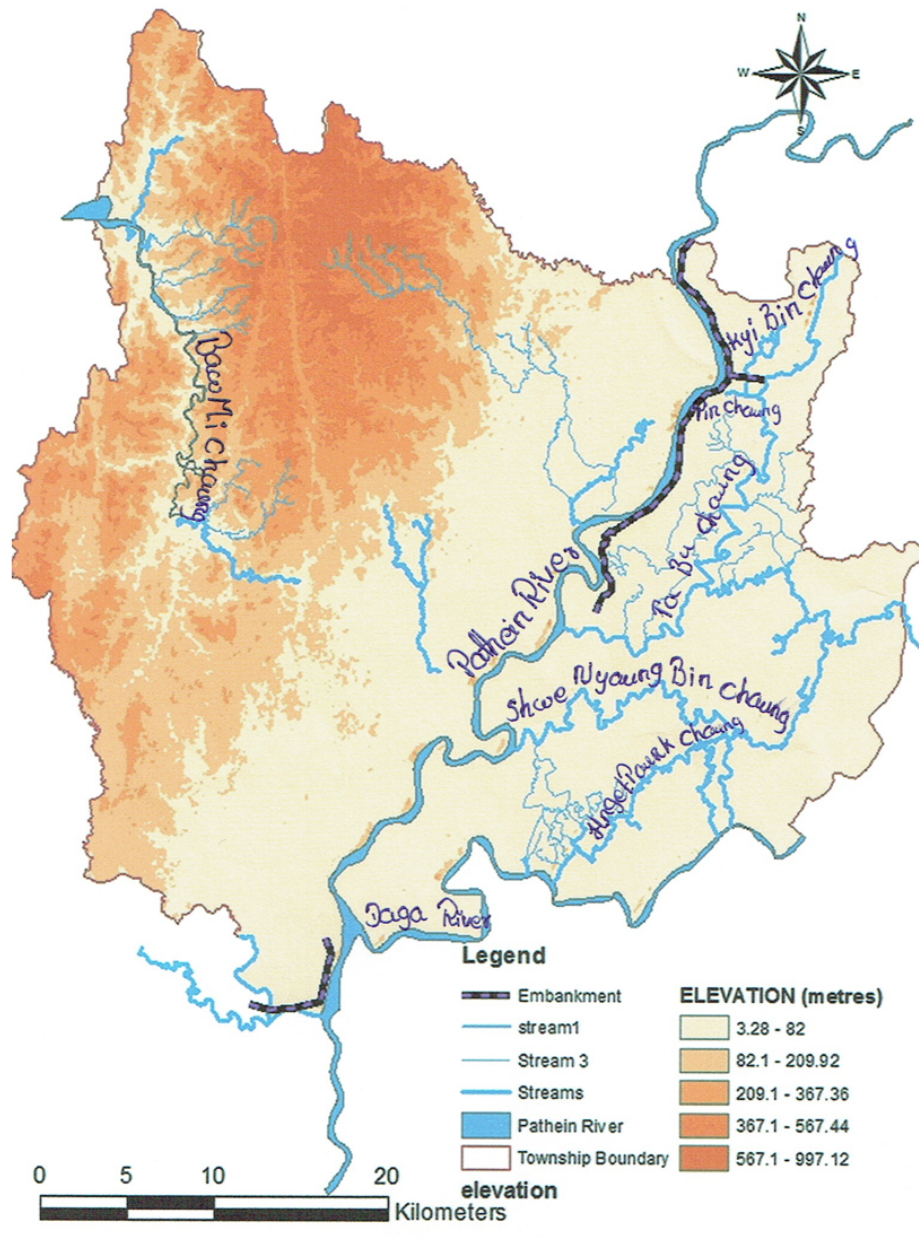
Map 4. Village Tract Map of Laputta Township with Thin Gan Gyi Village Tract (highlighted orange) and Labutta [sic] Village Tract (highlighted green). Map consists of post-Cyclone Nargis boundary lines, which today exclude the farthest West peninsula from the township. Map: Myanmar Information Management Unit (2010) modified by Michael Foster (2017).

Before visiting Laputta Township, my research focus was oriented purely to floods. However, throughout the data collection in Laputta Township, the main feedback received on environmental disasters was cyclone related. To collect data, I had to accommodate and expand my focus to encompass cyclones and other environmental hazards. While in Laputta Township, the overall focus of my thesis shifted to incorporate environmental hazards in general, not just flooding specifically.

### 5.1.2. Thabaung Township

My second research site, Thabaung Township in Western Ayeyarwady Region, was visited on 21 and 22 January, 2017. Thabaung Township experiences annual flooding and received particularly heavy floods in 2011, 2013, and 2015 (reliefweb, 2017). The Patheingyi River runs through the township and has many river tributaries within the township's boundary (Map 5). Laputta Township is characterized by hills in the west and low-land flood-plain in the east (Map 5). Similar to Laputta Township, Thabaung Township predominantly relies on rice

cultivation, but also has a notable paper mill in its West (Myanmar Industry Portal, 2015); echoing contacts references of a large lumber industry in the township's hill areas.

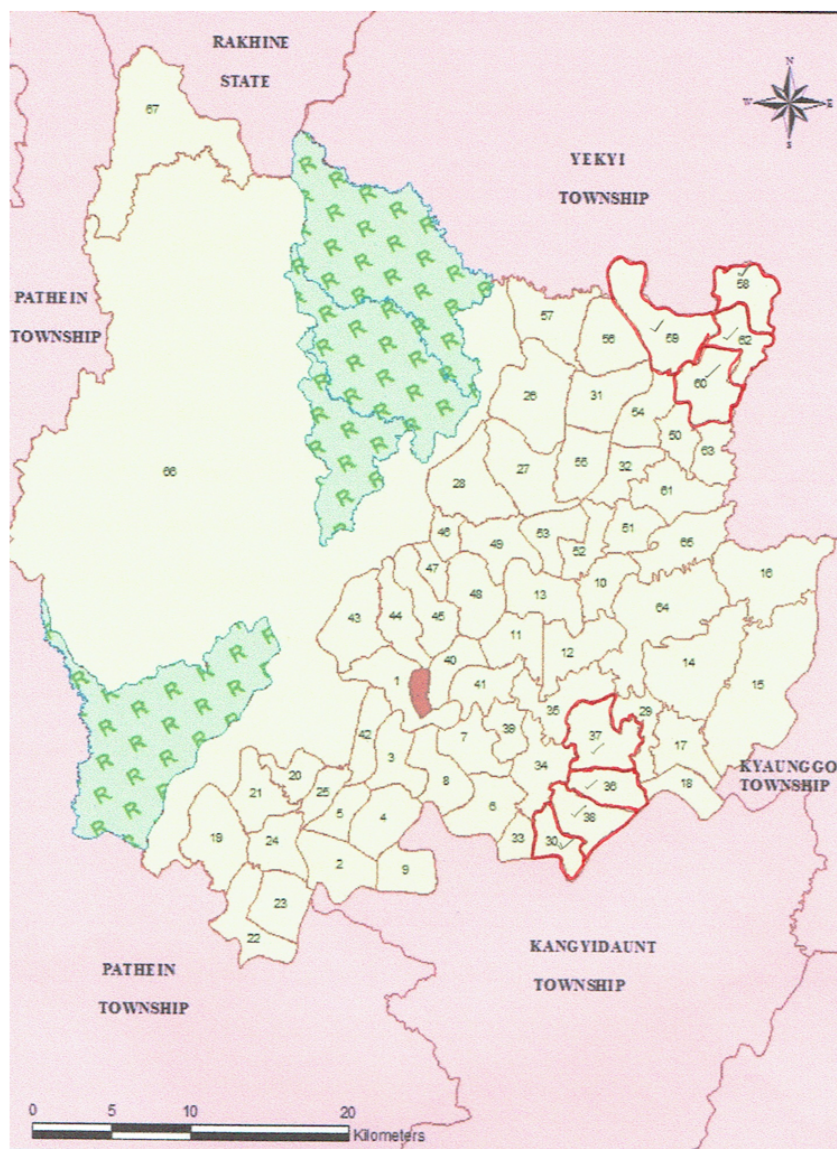


Map 5. River map of Thabaung Township. Map: Geography Department Patheingyi University (2017) modified by May Zaw Thung (2017).

Thabaung Township's total population is 156,037 people (Population and Immigration Department of Thabaung (PIDT), 2014). This population is dispersed throughout 67 village tracts in the township (PIDT, 2014). A total of eight village tracts were visited, conducting one focus



group interview in each, except in Sin Lan Village Tract where I conducted two focus group interviews. In the northeast part of the township I visited the village tracts of Yon Bin, population 2,297 (# 58, Map 6); Shweyaung Cha, population 2,666 (# 59, Map 6); Kyi Bin, population 2,453 (# 60, Map 6); and Nga Bat Chaung, population 2,052 (# 62, Map 6) (PIDT, 2014). In the southeast part of the township, I visited the village tracts of Nga Pyaw Daw, population 3,421 (#30, Map 6); Sin Lan, population 1,529 (#36, Map 6); Ok Shit, population 2,515 (# 37, Map 6); and Me Za Li Kwin Pauk, population 1,413 (# 38, Map 6) (PIDT, 2014).



Map 6. Village Tract map of Thabaung Township. Village Tracts' visited outlined in red. Map: Population and Immigration Department of Thabaung (2014) modified by Michael Foster (2017).

## **5.2. Urban Centers**

I visited Mon State and Yangon Region for the urban center focus of my research. From 1 to 16 February, 2017, I based myself in Yangon to organize and conduct research related to research objective 2. However, I traveled to Mawlamyine, the capital of Mon State, between 6 and 8 February, 2017, to interview migrants from the Ayeyarwady Delta. I then conducted research in Hlaingtharyar Township, Yangon Region on 12 and 13 February, 2017.

The urban center research aimed to determine if and why migration to urban centers occur. Migration is a complicated phenomenon, and the line between voluntary and forced migration, as the theory shows, can be blurred. Talking with individuals in the Ayeyarwady Delta about migration presented a peculiar situation since these individuals were still in their original area of residence. Meeting and interviewing individuals in urban centers post-migration presents a completely different demographic of people, compared to the Ayeyarwady Delta, with valuable insight related to their personal experiences of migration.

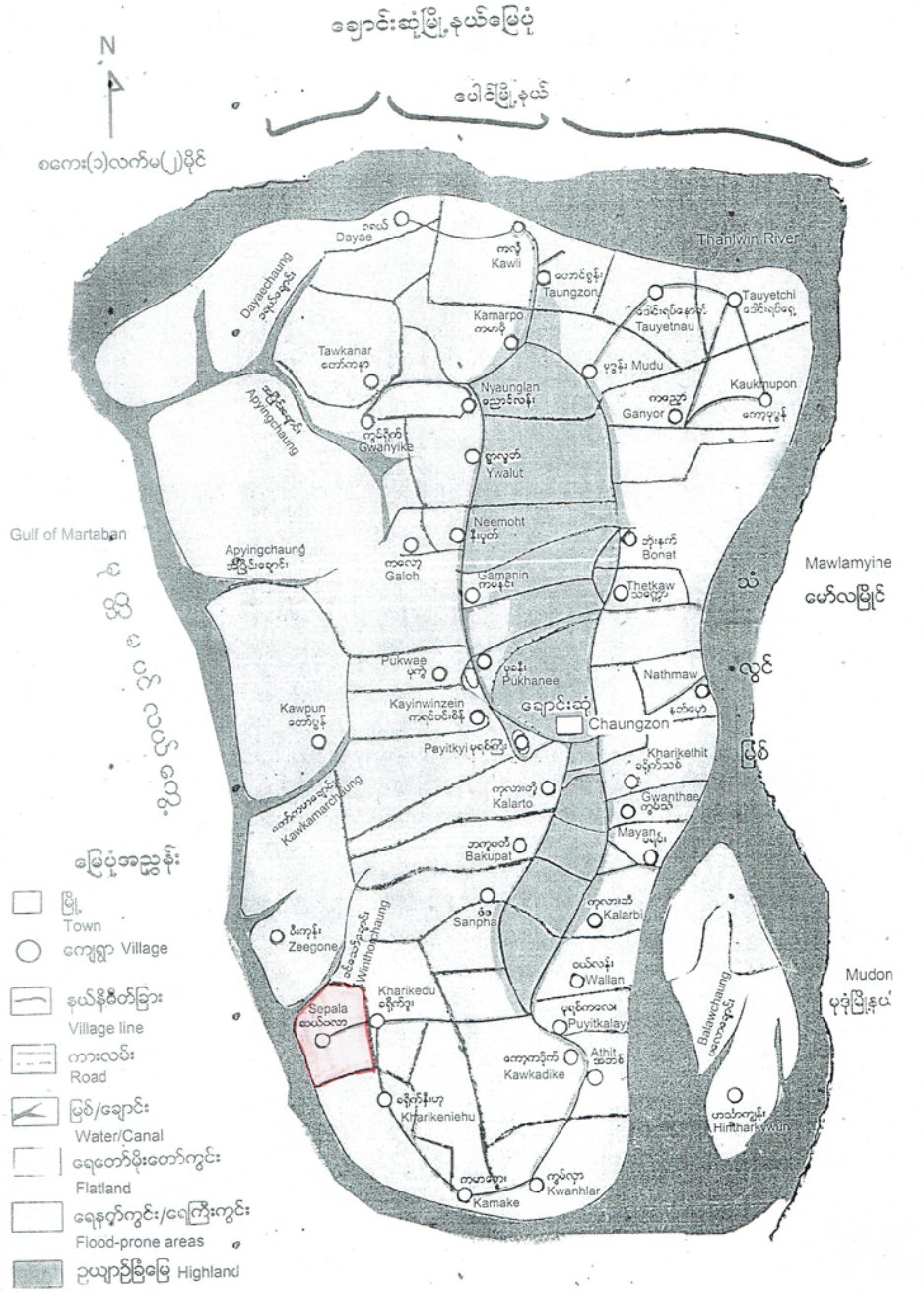
Therefore, to collect the appropriate data for research objective 2, I spent my time in 2 of Myanmar's 10-largest cities. In terms of population, Mawlamyine ranked number nine in Myanmar's largest city list and Yangon topped the list, as the country's largest city (DPMIP, 2014).

### **5.2.1. Mawlamyine, Mon State**

In Mon State, my research took me to the capital city Mawlamyine, where I traveled further to Chaungzon Township and then to Sepala Village Tract (Map 7). Within the village tract I conducted two in-depth informant interviews. Furthermore, I met with a township administrator on Chaungzon Township and conducted a key informant interview. Mon State has a total population of 2,054,393 people, of which 1,232,221 individuals live in Mawlamyine (DPMIP, 2015). Mon State is located on Myanmar's peninsular, against the Andaman Sea, and also shares a small border with Thailand.

The circumstances of *why* I ended up conducting research in Mon State were not expected. For one, I was led to believe there would be large pockets of migrants in Mawlamyine to which I could interview. I learned of this through academics and informants interviewed in the Ayeyarwady Delta, as well as my translator. When I arrived, however, I first learned that most of the migrant population lives outside of Mawlamyine. The area where large pockets of migrants

reside is on Chaungzon Township, an island across the Thanlyin River from Mawlamyine with a total population of 122,126 people (DPMIP, 2015). Specifically, I visited Sepala Village Tract and met with migrants from the Ayeyarwady Delta who reside in there.



Map 7. Village Tract map of Chaungzon Township. Sepala Village Tract highlighted in red. Map: Chaungzon Township (2017) modified by Michael Foster (2017).

The effort to travel and research in Mon State did not have an outcome which was completely desirable. I still managed to meet with migrants, but significantly less than expected. My time would have been better spent only in Yangon, but I was unable to conduct research there at that time because a meeting with contacts who directed me to migrants in Yangon's industrial zones became postponed. Thus, I lacked detailed information on how to locate migrants in Yangon, but still needed to continue with data collection.

### **5.2.2. Hlaingtharyar Township, Yangon Region**

Yangon is Myanmar's largest urban area with a population of 7,360,702 people (DPMIP, 2015). In 1973, the population of Yangon was 3,188,783 people (DPMIP, 2015). Therefore, Yangon's population increased, in absolute terms, from 11 percent of Myanmar's total population in 1973 to 14.3 percent in 2014 (DPMIP, 2015). Yangon's population resides in an area of 10,276.71km<sup>2</sup> (DPMIP, 2015). The World Bank Group (2015a) highlights that in 2010, there were 8,800 people per square kilometer in Yangon.

Yangon remains the country's main economic hub regardless of the fact Myanmar's capitol moved to Nay Pyi Taw in 2005 (BBC, 2017b). The specific area I researched in Yangon was Hlaingtharyar Township (Map 8). During interviews in the Ayeyarwady Delta, when interviewing individuals about migration issues, they indicated Hlaingtharyar Township as the area where most migrants relocate. Thus, I followed the pattern of migration to urban areas. Furthermore, I met with contacts at Yangon University who researched migration in Yangon's industrial zones. The academics further indicated, reaffirmed, and suggested Hlaingtharyar as the area where migrants reside, with many individuals originating from the Ayeyarwady Delta. I conducted research in Hlaingtharyar Township on 12 and 13 February, 2017.



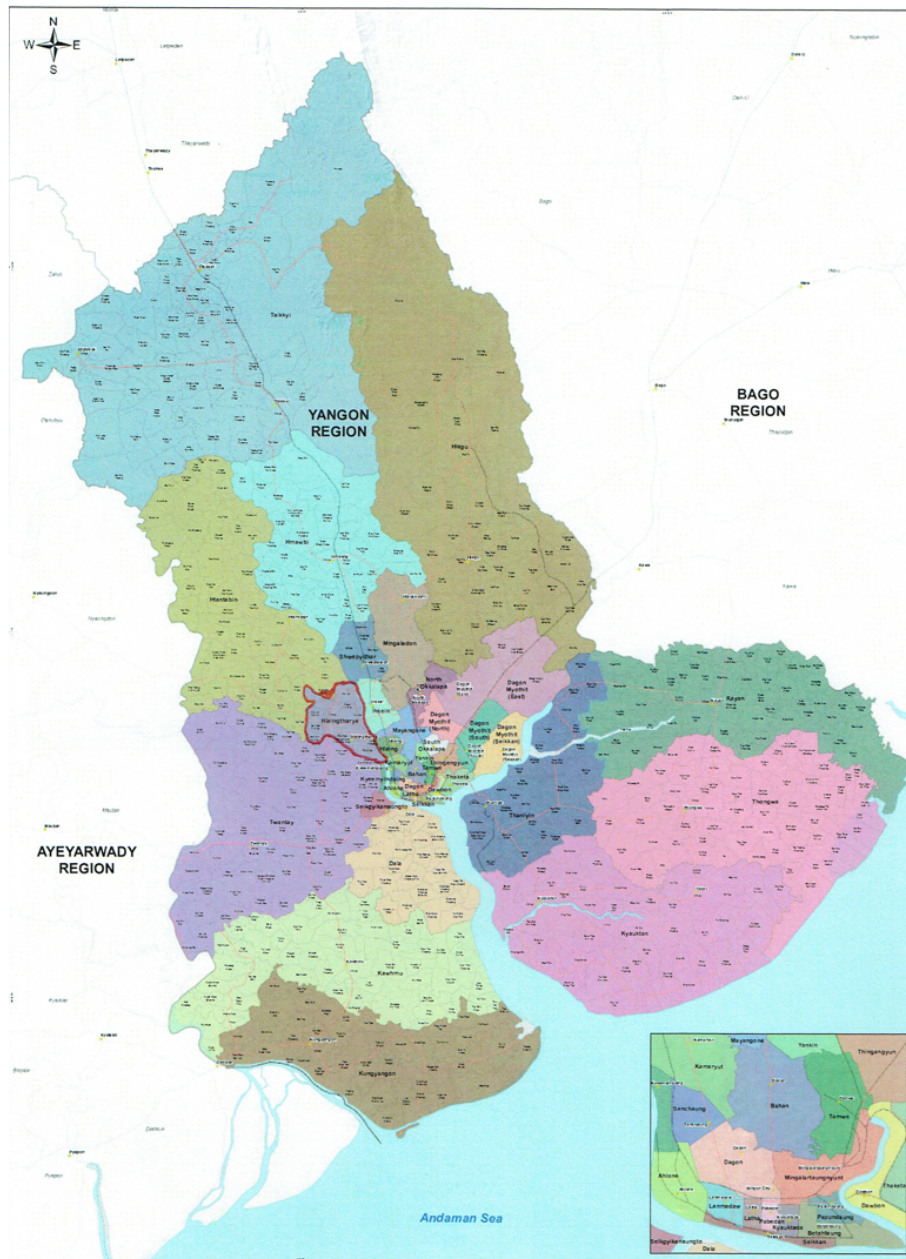
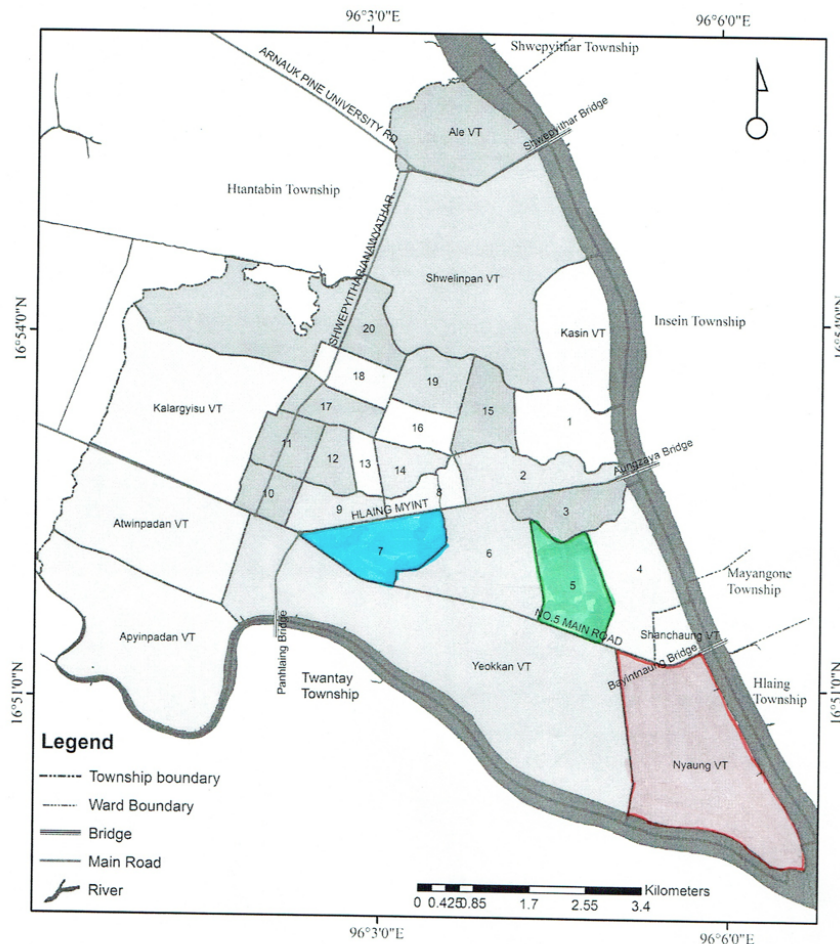


Figure 8. Yangon Region Township map, broken down further by Village Tracts. Hlaingtharyar Township outlined in red. Map: Myanmar Information Management Unit. (2016c) modified by Michael Foster (2017).

My research in Hlaingtharyar Township concentrated on two wards and two village tracts. However, when I visited Hlaingtharyar Township, I was only able to research one of the village tracts due local authority denying me access to the other village tract. Therefore, I conducted interviews in Ward 5, Ward 7, and Nyaung Village Tract (Map 9). In Ward 5, I conducted five in-depth informant interviews. Ward 5 had a population of 23,263 people in 2014, an increase

from 218 people in 1999 (Gazetter of General Administrative Department: Hlaingtharyar Township (GGADHT), 2014). In Ward 7, I also conducted five in-depth informant interviews. The population of Ward 7 was 25,405 people in 2014, an increase from 9,825 people in 1999 (GGADHT, 2014). And finally, in Nyaung Village Tract I conducted three in-depth informant interviews. Nyaung Village Tract had a population of 2,987 people in 2014, an increase from 331 in 1999 (GGADHT, 2014). My decision to focus on these areas was based off discussions with academics who researched migrants in Hlaingtharyar Township. Furthermore, based on the dramatic population increase over a 15-year period, these areas appealed to me, and the research, when choosing study areas within Hlaingtharyar Township. Furthermore, the wards and village tract picked directly overlap or sit next to industrial zones (Map 10).



Map 9. Village Tract map of Hlaingtharyar Township. Figure shows Nyaung Village Tract (highlighted red), Ward 5 (highlighted green), and Ward 7 (highlighted blue). Map: Survey Department and General Administrative Department Hlaingtharyar Township (2001) modified by Michael Foster (2017).



Figure 10. Industrial zones of Hlaingtharyar Township. Factories represented by red squares. Map: Survey Department and General Administrative Department Hlaingtharyar Township (2010).



## 6. Vulnerability and climate variability within the Ayeyarwady Delta

The PAR and Access models are used to contextualize findings from this thesis to highlight the vulnerability individuals within the Ayeyarwady Delta are faced with and subject to. First, the PAR model explores the progression of vulnerability, comprising the different factors which constitute an individual’s vulnerability. A multitude of climatic variables exist within the Ayeyarwady Delta, and shall be discussed in relation to the PAR model as well (Figure 1). Then, the Access model is reviewed in parallel with household livelihoods and the adaptation strategies individuals employ to confront environmental hazards. Environmental hazards impact already vulnerable individuals, compounding their vulnerability even further. Therefore, the final section of this chapter reviews adaptation strategies communities employ within the Ayeyarwady Delta to confront climate change impact.

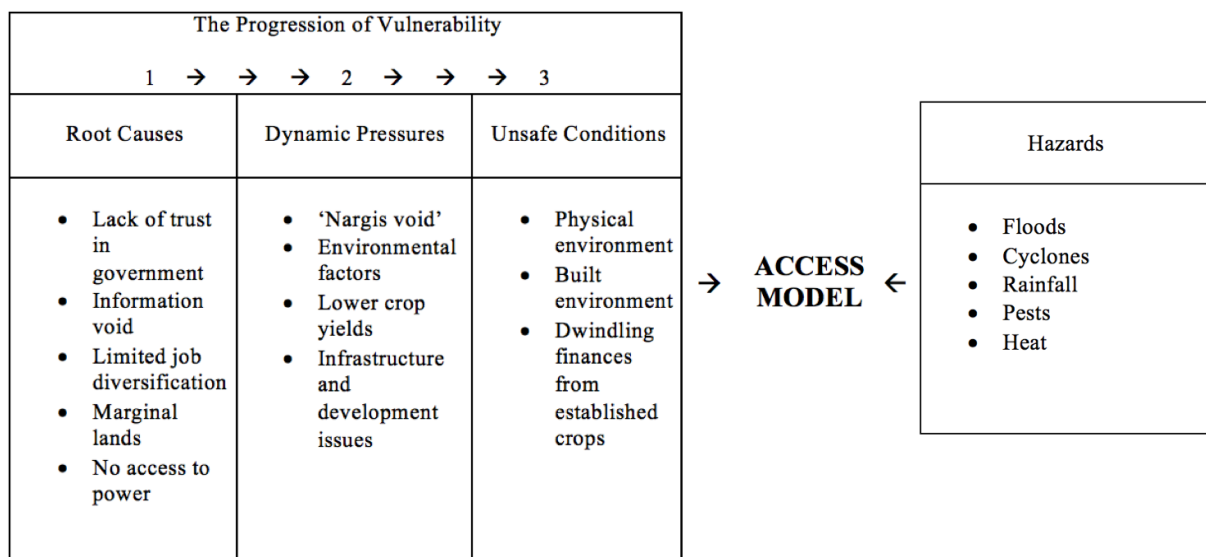


Figure 3. The PAR model in the context of the Ayeyarwady Delta (Wisner et al., 2004 adapted by Michael Foster, 2017).

### 6.1. Root Causes of vulnerability in the Ayeyarwady Delta

The root causes of vulnerability are intrinsic to a society and likely unapparent or unnoticeable by simple observation (Wisner et al., 2004). Root causes influence and institutionalize vulnerability, and are the “interrelated set of widespread and general processes within a society” (Wisner et al., 2004, p. 52). Furthermore, Wisner et al. (2004) states, “root causes reflect the exercise and distribution of power in a society” (p. 53). In the findings, both



human-induced social processes and naturally-occurring environmental hazards fall under root causes of vulnerability.

*Lack of trust in government:*

The feeling of a lack of trust in government stems partially from community and individuals' inability to participate in decision making processes. Largely, many individuals feel that even when they voice their concern or opinion to the government, changes never occur. However, this feeling also derives from decades-long military rule in Myanmar. Between 1962 and 2011, a military junta ruled in Myanmar, often with brutal and oppressive measures (BBC, 2017a). Numerous people referenced the correlation between their distrust in government and the long-standing power the military held in the country. Interviewees referenced the previous military-government's lack of published information on environmental harm as a major source of skepticism in the government. However, the 2015 National Elections saw the National League for Democracy transition to power (BBC, 2017a). Although weary, peoples' distrust in government slowly fades. However, decades of distrust have been instilled in individuals' perceptions of government.

*Lack of environmental information:*

Respondents alluded to the fact that during military rule an information void existed on environmental hazards. A lack of available research and reports on the environment and other environmental-related phenomenon in the Ayeyarwady Delta were cited as a source of frustration by respondents. Individuals shared a consensus that the environment is changing, but a severe lack of relevant information exists. The lack of information coincides with a lack of trust in government. For example, the then military-government suppressed information on the development of Cyclone Nargis, which then morphed into a major catastrophe (Larkin, 2010). Thus, individuals' express frustration in the lack of understanding about environmental changes occurring. The people desire information, and are frustrated not to have it.

### *Limited job diversification:*

There exists only a select number of job occupations to choose from within the Ayeyarwady Delta. Limited job variety stems from the history of the Ayeyarwady Delta and its agrarian dependence. The majority of Myanmar's job sector, and particularly the Ayeyarwady Delta, is based on agriculture (MCCA, 2016). Many within the agricultural sector find a lack of job diversification a constraint as wages and capital decrease. Furthermore, agricultural employment is largely determined by seasonal crop cycles and weather patterns (Ricepedia, 2012). Therefore, the inconsistency of work is prevalent given seasonal employment. Most respondents referred to their time confined in homes or shelters during rainy season as a source of unemployment. An interviewee shared,

*(During rainy season) much area flooded so we have difficulty with transportation, transportation problems. Much flooded water areas. To reach the next township where daily wages are, we don't have. Do not have work and anything to do. So we just have to wait. We can't do anything at that time.*

The majority of people from the research sites in the Ayeyarwady Delta find themselves out of work during the rainy season because of their dependency on agriculture. However, young people are particularly impacted, as work ceases to exist during rainy season, and other opportunities continue to degrade and decline as well. Since the young don't have steady work, alternative options, such as employment opportunities in Yangon and other urban centers, become attractive.

### *Marginal lands:*

The geography and physical environment of the Ayeyarwady Delta consists of a flat river-delta plane (Simmanee, 2013). Many geographic areas where communities live are in flat areas or basins where water cannot drain naturally. Some areas within the Ayeyarwady Delta can harvest rice crops two-times per growing season. However, in particularly low-lying areas, certain communities have the disadvantage to harvest only one rice crop per growing season. Such communities are in an environmentally unfavorable position which compounds vulnerability compared to others with either economic or political power (Blaikie & Brookfield, 1987 as cited in Wisner et al., 2004).

*No access to power:*

Communities and individuals in rural settings within the Ayeyarwady Delta have no methods to voice their opinion and be heard by the government. Therefore, most interviewees, whether farmers, shopkeepers, young, old, male, or female felt they had no access to power. Even more so, if individuals do have a chance to voice their opinion to government officials, either themselves or through a village representative (usually the village head), their opinion is seemingly overlooked. The lack of access to power is detrimental when decisions or conversation must transpire to address environmental threats. The lack of power is highlighted through administration neglect to confront villagers concerns about personal and community safety. Thus, individuals feel that they have no input based on items which impact them most, which reflects the power vacuum to participate in decision making processes.

Many of the root causes overlap and interconnect to comprise individuals' vulnerability. Communities visited had likeminded ideas of what would make them less susceptible to environmental hazards, because they reside in the areas which are most impacted by them. However, a constant frustration was that the government does not listen to them. A common theme was that individuals, families, or communities wanted to stay in the Ayeyarwady Delta because their lives have been spent there, as well as they understand their work trade, but simultaneously felt a desire to move based on diminishing employment options.

## **6.2. Dynamic pressures on vulnerability in the Ayeyarwady Delta**

Dynamic pressures within the progression of vulnerability “are processes and activities that ‘translate’ the effects of root causes both temporally and spatially into unsafe conditions” (Wisner et al., 2004, p. 53). Furthermore, dynamic pressures highlight underlying root causes of vulnerability and processes institutionalized within society (Wisner et al., 2004). The transitional phase of dynamic pressures is the most likely to spawn migration in the progression of vulnerability due to social and environmental constraints felt and experienced by individuals and communities. The themes under dynamic pressures felt by individuals or communities further interconnect and interrelate to form a complex mix of issues, embedding individuals into a vulnerable state.

*Impact of Cyclone Nargis:*

The term *Nargis void* was derived from the data collected in Laputta Township, showcasing the plight of individuals affected by Cyclone Nargis and the alteration of their lives from before the event in 2008, to after. Although Cyclone Nargis devastated the Ayeyarwady Delta nine years ago, the pressure still experienced and felt by communities in Laputta Township were insurmountable. Hardship is intrinsic to the individuals and their communities in Laputta Township. Perception differ significantly from before and after Cyclone Nargis. Many individuals expressed the immediate support and aid after Cyclone Nargis, but articulated that no more support exists today, as the prolonged impact of Cyclone Nargis continues to determine their lives. As one interviewee blatantly stated; “*Nargis changed everything*”. It was a sentiment echoed by nearly all participants; that Cyclone Nargis destroyed their land and altered the weather seasons. For example, a village head took me from the edge of a visited village to the river front 300 meters the opposite direction. When we waded into the water, he informed me that before Cyclone Nargis, the spot where we stood was the middle of their village. Because of the devastating impact of Cyclone Nargis, communities’ lives have changed dramatically, to the point where many respondents indicated they have no means or access to employment.

*Additional environmental factors:*

Within the Ayeyarwady Delta, there are a multitude of environmental factors which continue to adversely impact individuals’ livelihoods and well-being. Essentially, many communities are located in dangerous places. For one, communities in Northeast Thabaung Township are concerned about the river embankment, which separates their village from the Patheingyi River, as a major source of fright. Interviewees articulated that if the embankment were to fail, their village and homes would be destroyed, killing them and their families. Furthermore, respondents in every interview shared their views on changing rainfall patterns, flooding cycles, and cyclones, which all destroy agricultural crops. Interviewees expressed their concern of water shortage, for both drinking and irrigation, as another form of environmental pressure and the prevalence of new and increased quantities of pests on agriculture crops. Fundamentally, the reason why environmental pressures are a significant sub-category to dynamic pressures is that trends experienced by individuals have not been experienced before, so the challenges associated

with such monumental, compounding, and multiply-occurring events are unknown within communities.

*Lower crop yields:*

Consensus among interviewees was that harvest yields decrease in the face of environmental hazards. Thus, many of the interviewees rely on agriculture for livelihood, or have family members which do. Often, agriculture was the only financial asset within a family, or even a community. Therefore, when crops produce less yield, it leaves families in dire livelihood situations. A major issue was how land-owners required more pesticide and fertilizer input into their crops, to mitigate for declining harvests. An observation from the Ayeyarwady Delta was that fertilizer and pesticide advertisements were dispersed everywhere throughout the Ayeyarwady Delta. Yet, when the physical environment impacts crops at a rate they cannot regenerate, where both fertilizer and pesticide is futile, financial pressure mounts on families.

*Infrastructure and development issues:*

The issue connected to infrastructure and development presents a dynamic pressure of vulnerability in the Ayeyarwady Delta. Individuals without houses raised on stilts, or with weak supportive stilts, and local infrastructure for seasonal flood and cyclone shelters are inadequate to withstand environmental hazards. Many interviewees indicated that there is a problem with disaster shelters due to outdated infrastructure. Therefore, it was expressed that if individuals must stay at either schools or monasteries during floods or cyclones, they are worried the infrastructure would collapse during the environmental hazard. Regarding development, interviewees stated that many schools for their children are far away from the village. In one village, children must walk two miles (3.2 kilometers) one-way to access education, which proves a pressure when children must travel that far for school. And schools must close during flooding to accommodate disaster shelter for village residence. Furthermore, interviewees in rural areas of the Ayeyarwady Delta indicated that roads are built curvy, so if they need to access healthcare, it takes a long time to reach a doctor or hospital. Curvy roads also make evacuation during floods or cyclones difficult and time-consuming.

Many of the factors under dynamic pressures are interconnected and influence each other. Due to the above constraints, livelihoods are further eroded for individuals in the Ayeyarwady Delta. The constraints then pressure people to search for alternatives, especially when pressures compound and overwhelm numerous facets of life. Dynamic pressures impact vulnerability, and leaves individuals in a state where dynamic pressures transition into unsafe conditions.

### **6.3. Unsafe conditions to stress compounded vulnerability in the Ayeyarwady Delta**

Unsafe conditions within the progression of vulnerability encapsulate the tangible dangers and threats individuals face. Wisner et al. (2004) states that unsafe conditions “are the specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard” (p. 55). Unsafe conditions constitute the last ‘stage’ in the progression of vulnerability within the PAR model.

#### *Physical environment:*

The physical environment presents an unsafe condition to influence vulnerability of individuals. Paradoxically, unsafe conditions reflect on the area humans inhabit, which determine what environmental hazard impacts them. However, the most observable aspect of the physical environment generating unsafe conditions is the sheer-flatness of the Ayeyarwady Delta. Rice paddies extend as far as the eye can see, which leaves the topography distinctly flat. Due to the flat nature of the land, every environmental hazard has far-reaching impacts and the possibility to devastate both human populations and existing infrastructure. As an example, Cyclone Nargis had a storm surge that inundated land up to 40-kilometers from the coast which devastated the local communities (Webster, 2008). In the context of floods, the environmental condition can be highlighted from an interviewee stating; *“If they have a submarine in your government, if they have an extra submarine, they can leave here inside the rainy season”*.

#### *Built environment:*

The built environment within the Ayeyarwady Delta further heightens vulnerability. For one, the homes people inhabit are usually made with bamboo and thatch-roofs. Numerous respondents indicated that they feel unsafe in their homes because of the materials used for construction. Furthermore, homes must be raised on stilts in flood-zones within the Ayeyarwady

Delta. Many homes are either not raised high enough, or floods now exceed prior flood levels, which otherwise renders raised houses inadequate. Due to this dilemma, many villagers take up residents in shelters for the rainy season or during cyclones. However, because interviewees feel that shelter infrastructure is outdated and could collapse during environmental hazards, this option is loathed. The issue of embankments lead to unsafe conditions as well. An embankment intends to improve safety levels, but interviewees mentioned the embankment in Thabaung Township is unkempt. Thus, the issue of an embankment collapsing constitutes an unsafe condition because the settlements behind it would be devastated.

*Dwindling finances from established crops:*

A theme from all respondents is the issue of dwindling finances. For example, farmers in a focus group interview in Thabaung Township stated they only make 150,000 Myanmar Kyat (110.25 USD) per one-acre of rice paddy, per year. The farmers cannot live on this amount of money, and their livelihood is further disrupted when floods destroy their crops. When floods do destroy their crops, they are unable to replace lost assets due to the low price their crops yield. Low crop prices were found to be a major challenge for individuals and communities. When crop prices are low, profit either breaks-even or is lower than initial input costs, which drives individuals into debt. High loan prices are disadvantageous when individuals are already financially constrained. The cycle is recurrent as crops yield low prices, and farmers cannot input what they need due to supply costs. Furthermore, when individuals are out of work during the rainy season, their financial gain stalls. Individuals, especially non-landowning daily workers, lose work during the rainy season as crops are submerged, and other forms of occupation close, while the land is flooded. Especially when wages are severely low, any situation which reduces work elevates individuals' vulnerability. The lack of money and the scarcity of jobs is an unsafe condition because without capital individuals are left in a state of extreme vulnerability.

#### **6.4. Environmental hazards in the Ayeyarwady Delta**

Within the PAR model, environmental hazards signify events which can 'trigger' environmental disasters. The progression of vulnerability leads to compounded forces, which puts individuals in a vulnerable state, and combined with a single environmental hazard, or multiple ones, can lead to environmental disaster. The question is whether climate change increases the

impact of environmental disasters, and whether such events are becoming more intense and frequent. Furthermore, if environmental disasters increase in both intensity and frequency, how do already vulnerable people react to such an increase. A review of environmental hazards themselves must be analyzed because the Ayeyarwady Delta experiences multiple forms of environmental hazards.

#### *Floods:*

The main hazard in the Ayeyarwady Delta is flooding. Within Thabaung Township, every single respondent cited flooding as the number one environmental threat, while in Laputta Township it was the second most cited threat. Many interviewees discussed flooding in parallel with rainfall, but rainfall constitutes its own hazard category (discussed below). Respondents indicated that geographically, because of the river delta, flooding has been a consistent environmental phenomenon as far back as their community and family histories go. However, the consensus existed that floods are increasing in both frequency and intensity, reflecting on the issue of safety for individuals and communities. For example, out of a total of 66 questionnaires in both Thabaung Township and Laputta Township, 63 respondents indicated that floods pose a risk to their personal wellbeing. Furthermore, 59 out of 64 respondents felt that floods pose a risk to their community. Flooding exponentially increases the impact on individuals already in a vulnerable state.

#### *Cyclones:*

Cyclone threats constitute a significant hazard threat for individuals within the Ayeyarwady Delta. Interviewees from Laputta Township cited cyclone events as the most impactful environmental hazard on their communities, and stated that cyclones are felt along the whole Southern and Western coasts of the Ayeyarwady Delta. Within Laputta Township, respondents indicated that they, their families, and their communities are immensely worried about cyclone events after Cyclone Nargis. Cyclone Nargis, although an extreme event, time-stamped interviewees perceptions. Individuals felt that cyclones were on average, less intense before Nargis, compared to the average afterwards.

The people in Laputta Township had experienced cyclones their whole lives but a concern was that cyclones now occur outside the ‘normal’ season. In Laputta Township, interviewees



indicated that cyclones occur at increased intervals than before Cyclone Nargis in 2008. Thus, individuals felt that cyclones were more frequent, and further stated they feel the intensity of cyclones had increased, on average, than cyclones before Cyclone Nargis. Even more so, interviewees declared that cyclones have begun to occur outside of cyclone season in the last 5 to 10 years. The overall indication from interviewees was that cyclone patterns become increasingly abnormal.

*Rainfall:*

Rainfall as a hazard is closely associated with both flooding and cyclone events. Rainfall from across Myanmar directly influences flooding, and cyclones deposit significant amounts of rainfall on the country (reliefweb, 2017). However, numerous respondents indicated that rainfall constitutes a large enough threat to qualify as its own environmental hazard category, separate from both floods and cyclones.

Rainfall can be torrential, but respondents indicated the worrying factor was irregular rains. Interviewees shared that more rainfall has fallen but dispersed at irregular patterns. Thus, at times, due to irregular rainfall, there is not enough rain to sufficiently provide for crops. Overall, the rainfall is not consistent, it disrupts crop-growing patterns, and impacts crop yield. Over the last 5 to 10 years, rainfall has occurred before the expected monsoon season, and extended beyond it as well. Even more so, rainfall may have a late onset and early withdrawal period within the Ayeyarwady Delta. Interviewees indicated that there is a sense of rainfall variability, where predictions are impossible because no pattern exists anymore. Whether in Thabaung Township or Laputta Township, people from any occupation in interviews highlighted their concern of irregular and out-of-season rainfall.

*Pests:*

The least expected hazard for this research, but one of the most articulated and expressed concerns, was the prevalence of pests on agricultural crops. Every farmer interviewed in Thabaung Township and Laputta Township discussed an increase in pests on their crops. Furthermore, the pests on their crops over the last three to five years are species they have never experienced in the past. Therefore, the issue of pests qualifies as its own hazard category. Both the increase in quantity and the prevalence of new pest species intensified impact on agricultural

crops. Farmers agreed that decreased revenue correlates to diminished crop-harvest because of pests.

#### *Heat:*

The final hazards in Laputta or Thabaung Township which arose from my research was the issue of heat. Interviewees categorized the impact of heat in three different ways. For one, the prevalence of heat caused summertime crops to need more water, drawn from groundwater sources, which is needed for drinking water. Next, a scarcity of groundwater already exists, so irrigating crops over summer months is wasteful and trivial due to the heat. And finally, the heat itself destroys crops because the crops cannot survive the high temperature. Interviewees stated that water is either scarce or non-existent in summer. Moreover, it was shared that bottle water is now delivered to villages throughout Laputta Township to sustain communities and their need for drinking water.

Numerous environmental hazards impact the Ayeyarwady Delta, in this case Laputta Township and Thabaung Township. When environmental hazards impact humans in a vulnerable state, environmental disasters can form. The next 'layer' of the analytical framework is the Access model, which supports the PAR model by highlighting the complexity and specificities surrounding environmental disasters.

### **6.5. Hazard impact on household livelihoods**

As Wisner et al. (2004) states, "the Access model is designed to understand complex and varied sets of social and environmental events and longer-term processes that may be associated with a specific event that is called a disaster" (p. 88). In this research, the Access model is explored to the point of adaptation strategies. It is during this stage when individuals and families decide to migrate away from the Ayeyarwady Delta. Although several communities employ adaptation strategies, significant evidence points to the fact humans are migrating away from the Ayeyarwady Delta in larger numbers. Therefore, the Access model differs from the PAR model by explaining "at a micro-level the establishment and trajectory of vulnerability and its variation between individuals and household" (Wisner et al., 2004, p. 88). When livelihoods of vulnerable individuals erode, it leaves humans in precarious situations.

When environmental hazards destroy crops, the amount of yield and harvest decreases. In turn, interviews expressed that they make less money from their crops when environmental hazards strike their communities. All farmers, whether land-owners or not, make less profit because less crops are harvested. Furthermore, work is disrupted in the face of continuous environmental hazards. That goes for any form of occupation in hazard prone areas, because work is disrupted due to seasonal weather patterns or individuals evacuating to disaster shelters. The work continues to be disrupted until the season, or hazard, passes. Due to the fact individuals are out of work, household livelihoods are disrupted from the correlating loss of revenue.

Livelihoods correlate to amount of revenue generated, and environmental hazards clearly detriment household revenue. Respondents indicated that the largest revenue loss was from floods destroying crops. Farmers crops constitute their assets, and floods destroy crops. Individuals' assets are then irreplaceable, and the flood either significantly or wholly decreases revenue, depending on how much crop is lost. During flooding and cyclone season, people have no choice but to stop and wait until the hazards subside. As one interviewee stated; "*we just have to sit and wait, and there is nothing we can do or work until the water is gone*". Thus, no revenue is generated during these times. Day labors exist in a particularly vulnerable position due to the fact they make between 1,500 Myanmar Kyat (1.10 USD) to 5,000 Myanmar Kyat (3.68 USD) per day. This amount straddles the World Bank International Poverty line of 1.90 USD per day (World Bank Group, 2015b). When livelihoods are disrupted, it puts individuals in a dire situation where they have no access to revenue. Furthermore, farmers indicated that they need more input such as fertilizers, pesticides, or seeds for production. Yet, many do not have the revenue to fund this input, or spend the only revenue they have on input materials.

## **6.6. Environmental hazards transition to environmental disasters**

There are multiple ways in which the compounded events from the PAR and Access models transfer to a disaster. Essentially, an environmental disaster will occur when the combination of factors from the progression of vulnerability and livelihoods come to contact with an environmental hazard. However, although the PAR and Access models tend to separate environmental hazards from social processes, "in reality, nature forms a part of the social framework of society" (Wisner et al., 2004, p. 92). Yet, the environmental hazard still triggers the

transition to an environmental disaster. As Wisner et al. (2004) clearly demonstrates, environmental hazards transition to environmental disasters when normal life is attacked.

Both flooding and cyclones can spawn disasters. When either event completely, or even partly, destroys crops or other forms of revenue generation, it can constitute an environmental disaster. Almost every interviewee indicated that floods and cyclones have destroyed crops and other assets. A form of asset which can be destroyed are homes, especially when houses are not raised enough during flooding, or cyclones are powerful enough to destroy roofs or whole homes. However, when floods or cyclones destroy crops, it severely increases the severity of an environmental disaster. All interviewees stated that their lives dramatically change when their access to livelihood generation is destroyed.

Pests also constitutes a factor to prompt the transition to an environmental disaster. The issue of when, after flooding or a cyclone, a portion of the farmer's crop survives, but then pests destroy the remainder of the crop was cited as a major disaster by farmers. Farmers indicated that pests on their crops are ones which have not been observed before, where pesticides do not kill the species, so there exists little option on how to control the new pests. Furthermore, all farmers, and non-farmers alike, highlighted the fact higher numbers of pests – and of the new species – exist, compared to before the new ones were widespread. Due to the increase in numbers of new species, with no way to abate them, the pest run ramped and destroy crops, which amounts to decreased financial revenue.

The final category for the transition to disaster received from the data is when places of refuge from environmental hazards are destroyed or inaccessible. Furthermore, when shelters have potential to become destroyed *during* an environmental hazard. Thus, individuals are scared to access shelters because of old infrastructure and the possibility of an environmental hazard destroying the shelter. Furthermore, in Laputta Township, especially in the southern coastal area, cyclone shelters exist. A common concern from interviewees in Laputta Township was the issue of over-crowding in the cyclone shelter. When individuals cannot access shelters, in the words of an interviewee; “*We have no place to go*”.

## **6.7. Adaptation strategies to confront environmental disasters**

The critical aspect to the progression of vulnerability, livelihood issues, and environmental hazards is how individuals respond when an environmental disaster strikes. A limited number of communities have adopted adaptation strategies. However, the most repeated and recurrent response from interviewees was that individuals migrate away from the Ayeyarwady Delta as a strategy against vulnerability, environmental disasters, and a changing climate.

### **6.7.1. Non-migration adaptation strategies**

Adaptation strategies are largely split along community lines. Based off the questionnaire response, only 28 out of 64 respondents indicated their community develops adaptation strategies to confront flooding impact. This answer was fragmented purely between communities. For example, 3 villages almost unanimously indicated they develop adaptation strategies, while the other 13 communities did not. Yet, the strategies employed varied greatly depending on the community's initiative to alleviate disaster impact.

#### *Tree planting:*

One community in Northeast Thabaung township employed a strategy to plant trees throughout their village. Their hope was twofold. For one, they wanted the tree roots to hold the soil together, so less soil washed away during floods. And two, they wanted trees to serve as a barrier to lessen the force of flood impact on their community. Furthermore, the community had a strict rule that they would *only* plant new trees, without cutting young ones. The community had yet to see any results from their strategy because the trees were planted only two years ago.

#### *Different seed varieties:*

Another community, located in Southeast Thabaung Township, is experimenting with planting different varieties of crop seeds. They choose new seed varieties, mainly rice varieties, to suit the changing conditions within their geographic area of the Ayeyarwady Delta. However, they also implemented two changes in planting techniques, in combination with the change in seed varieties. The first was a change in planting time, where they would plant *after* the rainy season compared to before. The other, they would plant the rice, and let it grow where they

initially planted; instead of moving the rice to a new paddy once a seedling. This community only planted new seed varieties, and then let it grow in its original rice paddy. The results of this change were astronomical. An interviewee in the focus group, with the rest of the focus group in agreement, stated that; *“In the past, we only harvested 15 percent, but now it’s 95 percent. This is because of the new seeds and education [of planting techniques]”*. Based on the information the interviewees provided, and if correct, this change in percent-harvested is incredible. Yet, the interviewees indicated that the new seed varieties cost exponentially more than standard seed varieties, which categorizes this community as a wealthier one which can afford the seeds.

*Information sharing:*

Different communities mentioned information sharing as a strategy to alleviate disaster impact. However, although many communities were enthusiastic about the idea of information sharing, in practice little information had been shared between different communities. Yet, communities are apparently excited about the prospect of information sharing, and explained they shall institute such initiatives. Two communities mentioned they send a village representative to meet with the Ministry of Forestry to share information derived from community meetings about disaster threats. However, the communities indicated the Ministry of Forestry has done little to follow-up with their concerns.

*Structural strategies:*

Observations revealed that a strategy widespread throughout the whole Ayeyarwady Delta, including Thabaung and Laputta Township, was houses built on stilts (Photo 1). Many interviewees also indicated that to withstand flooding, their houses *must* be built on stilts. Another structural strategy is the use of embankments to contain both rivers and higher



Photo 1: House on stilts (Photo by Thet Naing Oo, 2017)

flood levels (Photo 2). In Northeast Thabaung an extensive embankment lines the Patheingyi River. An embankment gives relief to the communities behind that flood waters remain in the domain of the embankments lining the river.



Photo 2: River embankment in Northeast Thabaung Township (Photo by Michael Foster, 2017)

*External support:*

Outside support, although not an adaptation strategy, still provides an intervention aspect which would assist, alleviate, or improve individuals lives in the face of environmental disasters. Two communities mentioned that both local and international NGOs worked within their villages, as well as local volunteer groups. Interviewees indicated that the NGOs and volunteers donate food and water to withstand flood and cyclone impact. Although not a long-term adaptation strategy for the interviewees, outside intervention has the capability to support them in times of hardship. However, out of all the interview sites in the Ayeyarwady Delta, only two different villages prove a minimal number that has received outside support.

Two issues repeatedly arose when discussing adaptation strategies, particularly connected to agriculture. The first item consisted of increase inputs onto crops, such as pesticide and fertilizer. The other item was merely a continued attempt at ‘business as usual’ where the farmer

attempted to continue lifelong farming practices. Neither item proved satisfactory to combat environmental disasters as floods and cyclones destroyed crops, and pesticides did not kill or minimize new pests. Furthermore, many interviewees indicated that they repeatedly try the same techniques and practices to combat environmental disasters in which they have known their whole life. However, such practices still result in destroyed crops in the face of increased intensity and frequency of environmental disasters. Therefore, interviewees existed in a state of distress as they would repeatedly attempt the same adaptation strategies, with no avail, since they knew no other form of agricultural or livelihood practice.

### **6.7.2. Migration as an adaptation strategy**

The data collected found that migration away from the Ayeyarwady Delta acted as an adaptation strategy. The two forms of migration are voluntary migration and forced migration (discussed in section 7.3., *Voluntary vs. forced migration from the Ayeyarwady Delta*), while each is undertaken as a form to alleviate financial stress by seeking employment opportunities outside of local villages. Furthermore, within each form of migration, interviewees indicated that they themselves, family members, or other community members either engage in seasonal migration or permanent migration. From the data, migration is undertaken away from the Ayeyarwady Delta due to lack of financial capital, and the draw to other locations is because of employment opportunities.

Seasonal migration, sometimes termed seasonal worker, consists of an individual migrating to a new location for only part of a year to work, then returning home outside of that working season (IOM, 2004). Based on the data, anybody within a community, young or old, male or female, will undertake seasonal migration if employment opportunities exist elsewhere. However, although females pursue seasonal migration, males are far more likely to undertake seasonal migration. Furthermore, the data collected indicates that landless individuals undertake seasonal migration significantly more than land-owners. Seasonal migration predominantly takes place during rainy season, when no work and income-generating activities are available within flooded villages. The sole purpose of seasonal migration for interviewees in the research areas within the Ayeyarwady Delta was to generate additional income for households. For example, an interviewee from the Ayeyarwady Delta who undertakes seasonal migration to Chaungzon Township in Mon State indicated that they make equivalent to 2,000 USD during the rainy



season, just from migrating for work, compared to what would be 200 USD for the whole year in his home village. This example is stark, with most people not earning such a large wage hike. However, it shows that there are income-generating activities available outside of villages during rainy season, and people will chase employment when out of work, then return during productive weather seasons.

Individuals undertake permanent migration away from the Ayeyarwady Delta as an adaptation strategy due to decreased wages. The data indicates that young people are predominantly the demographic which permanently migrates. Interviewees indicated that young people migrate away to improve their life. However, it is common for families to also permanently migrate away from their home villages and communities. When families migrate, it is generally to follow other family members who previously migrated away. Both young people, or whole families, who migrate believe no opportunity exists in their rural village, so then to urban centers for work opportunities. As an interviewee stated; *“If people have opportunities, even poor work, they will go”*.

## **7. Sudden-onset vs. slow-onset disasters and voluntary vs. forced migration in the Ayeyarwady Delta**

This chapter will address a multitude of factors related to the phenomenon of migration. The first part of the chapter explores the theme of environmental disasters and whether such disasters are spawned and influenced by human practices or the natural environment. The second part of the chapter discusses the distinction between sudden-onset disasters and slow-onset disasters within the Ayeyarwady Delta. Finally, the concluding part of this chapter examines the nexus and distinction between voluntary migration and forced migration away from the Ayeyarwady Delta, and the reasons individuals give for one form of migration over the other. Often, however, the blur between each type of migration is muddled and overlapping.

### **7.1. Human-induced vs. climate change influenced environmental disasters**

Numerous environmentally degrading practices and environmental hazards exist in Myanmar. However, each event qualifies for its own distinction because they derive from different sources. Some disasters are influenced by human-induced environmentally degrading practices; predominantly through development projects and resource extraction. Although climate change can also be viewed as an anthropogenic triggered phenomenon, for the purposes of this subsection, climate change illustrates an environmentally-derived process.

#### **7.1.1. Human-induced disaster events**

##### *Deforestation:*

Deforestation in Myanmar was continually cited by interviewees as a source influencing environmental disasters. Participants, particularly in Thabaung Township, cited that deforestation in both upper-Myanmar and Thabaung Township caused floods to increase in intensity, and added sediment to the water. The intensity of floods destroyed crops, but the sediment dirtied the water so it could not be used as drinking water. Sovacool (2012) demonstrates that each year 275,000 acres of natural forest are cut and destroyed in Myanmar, predominantly for an energy source (as cited in Than, 2005). Thus, respondents feel that because large swaths of forest are destroyed throughout Myanmar each year, it adversely impacts communities downstream. Furthermore, communities in Laputta Township feels that a reduction in mangroves contribute to increased impact from cyclone events because of destroyed natural barriers. Sovacool (2012)

confirms that extensive swaths of mangroves in the Ayeyarwady Delta are cut to produce firewood and charcoal. Therefore, respondents in different areas feel that deforestation affects them in a variety of ways, but still attributes to an overall increase in environmental disaster impact.

#### *Hydropower development:*

Respondents further identified hydropower development projects in upper Myanmar as a source to increase intensity and frequency of flooding events. Although separated by nearly the whole length of the Ayeyarwady River, individuals in the Ayeyarwady Delta felt impacted by dams in Northern Myanmar. Simmance (2012) indicates that dams, along the length of any river, have grave implications for their delta ecosystems and flood cycles. The individuals who felt dams as an impact on flooding within their communities pointed to the fact flood cycles are altering. Currently, there is a whole spate of hydropower development projects planned in upper Myanmar (Simmance, 2012). Therefore, interviewee concerns about the increase of flooding impact intensifies as continued hydropower projects are planned in upper Myanmar.

#### *Embankments:*

Within Thabaung Township embankments were a major source of concern for interviewees. Those downriver from the embankments remarked that they believed the embankments caused rivers to flow unnaturally, since the water is confined by the embankments. Interviewees believed that when the embankments ended, water flooded flat land in a torrential manner since there was no natural escape where the embankments existed. Those downstream of the embankments felt floods become heavier with the embankments but resented the fact they do not have embankments to protect their communities.

### **7.1.2. Naturally-induced disaster events**

The naturally-induced disaster events encompass the exact categories of hazards explored in section 6.4, *Hazard events in the Ayeyarwady Delta*. Therefore, to minimize repetition, a brief overview will exam those environmental disasters. Naturally-induced environmental hazards constitute the most prevalent and cited event which impacts individuals within the Ayeyarwady Delta. Within the Ayeyarwady Delta, interviewees highlighted their concern and observations

about flooding, cyclones, rainfall patterns, pests, and heat. Overall, the response from interviewees indicated that disasters are increasing in both frequency and intensity because the climate is changing.

Although human impact can directly influence these events, interviewees believed that largely, and for some, wholly, it is natural patterns and climate change which spawns environmental disasters. Of course, interconnectivity occurs between human-induced and naturally-occurring disasters, but the magnitude of naturally-occurring disasters constitutes its own category.

## **7.2. Sudden-onset vs. slow-onset disasters within the Ayeyarwady Delta**

### **7.2.1. Sudden-onset disasters**

Sudden-onset disasters are comprised of events such as cyclones, flooding, and mudslides caused by rainfall and are immensely destructive and disastrous for communities impacted by them (Kälin & Schrepfer, 2012). However, within the data collected from the Ayeyarwady Delta, only one form of environmental disaster falls within the definition of sudden-onset disaster, which is cyclones.

One cyclone in the past 10 years particularly constitutes as a sudden-onset disaster; Cyclone Nargis in 2008. Cyclone Nargis fits within the boundaries of a sudden-onset disaster due to its instantaneous, single-event nature. Cyclone Nargis cannot be attribute directly to climate change, as sudden-onset disasters have potential to cause high death tolls and displacement regardless of climate change (Kälin & Schrepfer, 2012). The destruction caused by Cyclone Nargis can also be largely attributed to political deficiency at the time of the event. For one, the previous military-government ignored calls to suspend a referendum on a then government-sponsored constitution to instead focus on disaster relief (Larkin, 2010; Seekins, 2009). Also, the government had adequate warning before the cyclone hit Myanmar, but downplayed the severity of the storm (Webster, 2008). And finally, after the Cyclone Nargis hit Myanmar, the then government delayed and muddled foreign aid-efforts by restricting international assistance due to superstition related to of Myanmar's sovereignty being threatened (Larkin, 2010; Seekins, 2008). The military-government at the time was rife with political dysfunction and marred pre-warning systems, along with relief efforts, which compounded the destruction of Cyclone Nargis.

Although military-government dysfunction plagued the plight of those affected and killed by Cyclone Nargis, the pure energy of the storm still constitutes a disaster. The storm surge of Cyclone Nargis extended 40-kilometers into the Ayeyarwady Delta, which caused extensive damage and death (Nansen Initiative, 2014a; Webster, 2008). Both social and environmental issues played a role in the destruction Cyclone Nargis caused within the Ayeyarwady Delta. However, due to that the cyclone's natural conditions, it qualifies as a sudden-onset disaster.

### **7.2.2. Slow-onset disasters**

Slow-onset disasters are the most prevalent disaster in the Ayeyarwady Delta. All data indicates that the impact of slow-onset disasters will only increase into the future. Slow-onset disasters consist of multi-causal dimensions which define their complexity (Warner, 2010). The evidence of slow-onset disasters within the data collected consist of floods, rainfall, pests, and heat and water shortage. Furthermore, small-scale cyclones constitute slow-onset disasters as their impact are within slow-onset disaster's parameters. Trends that constitute slow-onset disasters are apparent within the Ayeyarwady Delta. Interviewees indicated that slow-onset disasters seem the most daunting to confront, giving disasters' multi-casual nature. The trends which fall under slow-onset disasters constitute an especially interconnected situation, where all events occur simultaneously, which adds to the complexity of slow-onset disasters.

#### *Floods:*

Floods comprise the most recurrent and noticeable environmental disaster in all communities within the Ayeyarwady Delta. Interviewees highlighted that in the last 10 years, both the frequency and intensity of flooding events have increased. The common view was that heavily impactful floods, which destroy crops and cause severe livelihood pressure, used to occur every three to five years. However, the phenomenon where floods destroy crops and leave communities in despair now happens annually. Even more so, these types of floods occur multiple times annually, up to three-times per flooding season. It was expressed that this type of flood frequency would have been unheard of 10 years ago.

Agricultural crops are particularly impacted by flooding, as more crops are destroyed by both the increase in frequency and intensity of floods. Farmers who used to be able to harvest crops two-times per year cited their harvest regularly drop to only one-time per year now, or

possibly even zero harvest because their crop was completely destroyed. Furthermore, farmers who, historically, were able to harvest one-time per year often experience a whole year's crop destroyed by flooding as well. Farmers feel floods have decreased their harvest, or destroy and wash away whole crops. Extensive crop damage occurred in 2012, 2014, and 2015, while farmers indicated that whole crops were destroyed and no profit were made those years.

The questionnaire responses indicate and reflect how interviewees perceive flooding threats. Out of 65 questionnaires, 64 respondents believe the *frequency* of flooding events have increased the last 10 years. Furthermore, 40 respondents felt that flooding events have increased in *intensity* as well. Although fewer individuals believed intensity in flooding events increased, the data indicates that a significant portion of the population feel that intensity has increased. The consequences of flooding on communities within the Ayeyarwady Delta is validated by 100 percent of respondents, from 65 questionnaires, who feel flooding negatively impacts their communities.

#### *Cyclones:*

Although Cyclone Nargis falls under a sudden-onset disaster category, compounded and repeated small-scale cyclones can be categorized under slow-onset disasters. Cyclone Nargis is the marker when significant transitions in cyclone patterns began to occur within the Ayeyarwady Delta. Respondents indicated that after Cyclone Nargis, cyclones appear to increase in both intensity and frequency. Interviewees indicated that before 10 years ago, impactful cyclones would occur one-time every 3 to 5 years. Yet, interviewees now assert that cyclones occur annually every year. Interviewees within Laputta Township stated that in Summer, 2016, they had to evacuate to a cyclone shelters two times, which, they stated, had never occurred in their lifetime before. Furthermore, cyclones appear to occur out-of-season more frequently than before, severely disrupting work when unexpected.

#### *Rainfall, pests, and heat:*

Intertwined and interconnected with both flooding and cyclones is the prevalence and irregularity of rainfall, pests, and heat. In every interview within the Ayeyarwady Delta, interviewees voiced their concern and observation of these three environmental disaster events, which fall under a slow-onset disaster category. They discussed how changing weather patterns

make rain irregular compared to prior experience; plus rainfall is sporadic when it falls, so the quantity deposited is unknown. Pests also constitute a slow-onset disaster because in the last three to four years, greater numbers of pests occupy farmers' crops. Furthermore, the current species which occupy crops have never been experienced before. Thus, farmers do not know how to combat the pests, with the pests destroying more crops each year. And finally, heat falls under slow-onset disasters. Interviewees indicated that temperature has been higher the last 10 years, with extreme heat over the last 5 years. They attribute the rise in temperature to crop-loss, as their crops cannot resist the intense heat, especially in summer. The interviewees stated that the consistent high heat had not been experienced before, although there had been infrequent years with higher-than-average temperatures. Interviewees in Laputta Township stated that when acute water shortage existed in the past, they would rely on palm-water for emergency drinking water. Yet, for two years in a row, all palm-water has dried-up due to severe heat, which has never happened before.

### **7.3. Voluntary vs. forced migration from the Ayeyarwady Delta**

The boundary line between voluntary and forced migration can often be blurred and complex. However, a form of *coercion* must exist in order for migration to be forced, but determining coercion proves arduous (IOM, 2011). From the data collected, individuals undertake both voluntary and forced migration from the Ayeyarwady Delta. Both forms of migration must be analyzed to better frame overarching themes of the migration phenomenon. Interestingly, individuals gave the same reasons for migration under each migration category. Whether male or female, young or old, agricultural workers or other form of employment, and individuals with children or without children, there was no specific category of people who cited voluntary migration over forced migration. Rather, the dividing line between certain types of migration was based exclusively on socio-economic boundaries, split between poor and extreme poor. Poor individuals, possessing just a fractional amount of capital, were far more likely to cite voluntary migration in the overall discussion, whereas people in extreme poverty referenced forced migration. Interviewees felt their future within the Ayeyarwady Delta remains uncertain based on current, and developing, climatic conditions. Both groups gave the same reasons for migration, but their rhetoric and viewpoint of migration was what distinguished them into different groups.

### 7.3.1. Voluntary migration

Two general themes emerged when interviewees discussed voluntary migration away from the Ayeyarwady Delta. Their reasons were grouped into how better job opportunities exist elsewhere and the trend of seasonal migration. Within the questionnaire, 65 out of 66 respondents had undertaken voluntary migration at a certain point in their lives because they thought river flooding would increase in the future. The questionnaire response demonstrates that environmental factors such as flooding are intrinsic factors influencing migration.

Within the data, the rhetoric of *better job opportunities exist elsewhere* are largely where the divide between poor and the extreme poor emerges. The people who reference their migration, or know others who have migrated, in regards to better job opportunities have access to spare capital, however minimal. There is no particular occupation or specific category these people fall into, but in this research, they are classified as *poor*. The World Bank sets their International Poverty Line at 1.90 USD (World Bank Group, 2015b). Although the International Poverty Line places poor individuals making less than 1.90 USD per day underneath the line, in this research poor individuals fall just below, on, or just above the International Poverty Line because poverty consists of variations, not just a set, standardized number. As the Integrated Household Living Conditions Assessment Project Technical Unit (IHLCA) (2011) indicates, caution must be drawn from the interpretation of poverty levels and trends.

If any sort of category can be drawn to poor people who cite voluntary migration, it would be land-owners who control the production of crops. Thus, if the poor, including land-owners, seek employment for more money, or even a less labor-intensive trade, they may voluntarily migrate. Voluntary migration is used as a reason for people who wish to make more money, or diversify their employment prospects. This form of voluntary migration is generally long-term, and may become permanent. Although minimal, such individuals may have saved some capital before migration, but they nevertheless undertake voluntary migration to seek improved lives.

The other form of voluntary migration interviewees referenced was seasonal migration. Seasonal migration stems from the idea of improved lives, but still constitutes its own category of voluntary migration. Many interviewees migrate during rainy season to maintain work and financial income. Furthermore, seasonal migrants who locate to certain areas of Myanmar can get paid more, for less work, than they would in their home villages. Once the work season is complete, migrants return to their home villages.



### 7.3.2. Forced migration

Interviewee responses provided three main reasons for forced migration away from the Ayeyarwady Delta. The reasons for forced migration are employment, multi-casual reasons, and survival. All three reasons are intertwined with environmental factors, and especially coupled within issues of slow-onset disasters. Based on the questionnaire, 26 out of 64 respondents indicated they had been forced to migrate at some point in their life because of river flooding. Although less than 50 percent of respondents had been forced to migrate previously, it does not disqualify the overall significance of forced migration. In fact, it shows that environmental disasters are impacting human beings, and forcing a considerable number of individuals from their home. The individuals who reference forced migration constitute the category of the *extreme poor*.

Extremely poor individuals generally fall below the World Bank International Poverty Line of 1.90 USD. The same notion that relates to poor individuals prevail, that variations exist in the depth of poverty for individuals. The International Poverty Line sets a useful indicator at 1.90 USD, but in reality, poverty is fluid and contextual based, which is why these people are classified as the extreme poor. The extreme poor migrate based on either family or community networks already established within Myanmar's urban centers. Although individuals in extreme poverty lack financial surplus, they generally have networks to rely on in areas of relocation.

Employment opportunities were cited by interviewees as the number one reason why they and their community members were forced to migrate. This runs parallel to voluntary migration, where interviewees still provide employment as a reason for migration. However, interviewees under this category implied that *coercion* exists related to employment opportunities and forced migration. Extremely poor people feel forced to migrate because of a lack of jobs and employment in their villages. If such people do hold jobs, it is for a minimal amount of money where they cannot support themselves or their family. As one interviewee stated; "*No opportunities exist here, so people are leaving*".

Consistently throughout interviews, young people were referenced as those with the most pressure from lack of job opportunities, and in turn those who are forced to move away. Interviewees stated that no job opportunities exist for young people in villages. Therefore, young people designate a significant demographic who are forced to migrate away from the Ayeyarwady Delta. Through observation, it was noticed that in most villages where interviews

took place, no young people were present to interview. When the village head was asked to find young people to talk with, the response which came back was no young people remain in the village because they work elsewhere in Myanmar. Because young people cannot get jobs in their villages, they are forced to migrate for employment.

Although forced migration is largely attributed to employment, there are threads of other factors which influence the forced aspect of migration. For one, the issue of the 'Nargis void'. When discussing with an interviewee in Yangon about forced migration, they responded; *"We had nothing left [after Nargis], so we had to move here"*. A severe environmental disaster such as Cyclone Nargis continued to impair the affected population nearly 10 years after the event. Another interviewee indicated that a brother was hurt in an accident in Yangon, so the family felt obligated to take care of them. Therefore, this interviewee indicated they were forced to migrate to take care of their brother, since there was no other means to support the injured family member.

The final factor influencing forced migration is pure survival. Interviewees indicated that forced migration was the only action they could make to continue surviving. An interviewee summed this feeling up by stating; *"The people cannot survive unless they move"*. The feeling that migration is the only form of survival can reflect on the social situation where people must provide for their families, but also highlights the difficulties to provide bare necessities in the Ayeyarwady Delta. For example, interviewees indicated they were unable to afford vegetables in their village, which shows the dire situation faced by people in the Ayeyarwady Delta. Also, when discussing forced migration an interviewee stated; *"There is not enough rice, so they move"*, which reflects the sentiments of numerous other interviewees.

By all indications, forced migration is a phenomenon which developed within the last 10 years; and to a large degree within the last 5 years. One interviewee stated bluntly; *"This didn't happen before 5 years ago"*. A common theme was that the onset of life-altering environmental disasters has taken communities by surprise within the Ayeyarwady Delta. Another interviewee stated; *"At first we weren't worried, but now [we] are with heavier impacts"*. And individuals perceive their outlook within the Ayeyarwady Delta as grim. A farmer suggests; *"In two to three years I believe the water [will be] extremely powerful"*.

## **8. Migrants within Myanmar's Hlaingtharyar Township**

This chapter will address the issue of migrants within Myanmar's Hlaingtharyar Township. Such a focus spawns from the last findings chapters, where the issue of vulnerability and its impact on migration was explored. In this chapter, the path of migrants will be followed into an area of relocation for migrants. The issues of employment, housing, and education for migrants' children are all interconnected. Each category influences one another, and determines individual's experiences regarding the rest. This chapter will be separated into subsections dealing each with employment, housing, and education for migrants' children.

The population of Myanmar's 10-largest cities is increasing (Khaing, 2015; DPMIP, 2015). Yangon, Myanmar's largest city, doubled in population from 1973 to 2014, from 3,190,359 to 7,360,703 people (DPMIP, 2015). Furthermore, within Yangon's Hlaingtharyar Township, the industrial zone in which interviews from the second part of this research was conducted, the population has increased dramatically. In 2004, Hlaingtharyar Township had a population of 252,316 individuals, by 2014 the population had more than doubled to 686,827 people (The General Administrative Department Hlaingtharyar Township, 2014). Such data overwhelmingly indicates that Hlaingtharyar Township's population has increased, and based off the data, suggests migrants seeking employment opportunities within Hlaingtharyar's industrial zones contribute to the population increase.

### **8.1. Employment within Hlaingtharyar Township**

The pull factor for migrants to Hlaingtharyar is employment. All data, from interviews and questionnaires, showcase that the *main* reason for migration to Hlaingtharyar is to find work and increased wages. To illustrate this point, 21 out of 22 respondents indicated *employment* as their reason for migrating to urban centers.

Hlaingtharyar Township has two predominant industrial zones within its area, as well as other factories dispersed throughout the township (Survey Department and General Administrative Department Hlaingtharyar Township, 2010). The presence of industrial zones and factories highlight the reason why migrants pool in this township. Every interviewee indicated that they were able to find jobs in Hlaingtharyar. Three older women who were dependents – financially relying on their husbands and children – chose not to work. Yet, they clarified that if they desired to work, they could find employment in garment factories. However, migrants'

perceptions of job security differ substantially. Only 10 of 22 respondents believed they maintained a secure job. Such a discrepancy, between all interviewees able to find work, derives from the fact that some migrants are daily workers, while some maintain full-time, contracted work in factories. All individuals live near the international poverty line of 1.90 USD (World Bank Group, 2015b). Therefore, poverty was a constant theme of every interviewee's life within Hlaingtharyar, and the distinctions based on 'rich' and 'poor' is unfounded. Rather, the largest distinction between groups in urban centers, and their wellbeing within them, is whether they are contracted factory workers or daily workers, which determines income and level of poverty.

Generally, although there was overlap between distinguished boundaries, contracted factory workers are farther above the 1.90 USD international poverty line than daily workers. To distinguish categories, contracted factory works are referred to as living in *poverty* while daily workers are considered living in *extreme poverty*. In Myanmar, the daily workers interviewed, on average, make slightly more than the 1.90 USD International Poverty Line threshold which determines poverty. However, the United States Agency for International Development (USAID) (2015) states that a factor which determines extreme poverty is when human dignity is denied. Furthermore, USAID (2015) continues that extreme poverty comprises individuals who are forced to make unimaginable choice regarding food, housing, and education. Therefore, since all indicators constrain daily workers' lives, they are categorized as living in extreme poverty. Even more so, the rate of transitory poverty in Myanmar is 3 times higher than chronic poverty, at 28 percent of the population. Poverty is not confined to the 1.90 USD International Poverty Line, but consists of the contextual situation individuals find themselves, which highlights why daily workers are considered extremely poor.

Contracted workers undertake work in factories within Hlaingtharyar's industrial zones. From the data collected, contracted workers shared that they worked in garment factories, cleaning supply factories, and fish-processing factories. However, all interviewees stated that any form of factory work usually entails a contract involving monthly salary, where daily workers are paid on a day-by-day, job-by-job basis. The interviewees indicated that they learned of work through family networks, when a family member referred them to an open job position. The interviewees then had to undertake a formal application process to provide identity cards and resident documents.

On the opposite end of the spectrum are daily workers. The work associated with daily workers is sporadic, leading to uncertainty over secure job opportunities. Interviewees who conduct daily work indicated that work is never guaranteed. Individuals in this situation have difficulty in both housing and education due to continuous financial constraints. For example, all daily workers interviewed were unable to send their children to school. Therefore, daily workers felt a constant constraint to provide financial security and wellbeing for their families.

### **8.1.1. Financial constraints facing migrants within Hlaingtharyar Township**

With both contracted workers and daily workers, the issues surrounding their livelihoods and wellbeing are multi-faceted and largely connected to financial issues. Thus, to perceive whether migrants' income opportunities improve or decline in Hlaingtharyar, a detailed review of their employment particularities is warranted.

To begin, *all* interviewees indicated that their salary has increased in Yangon, highlighting the reason why people undertake migration to Hlaingtharyar. Many interviewees indicated that a migrant can make double the salary in urban centers compared to where they are from. Thus, migration to urban centers does provide higher wages for individuals. The increase in salary is largely attributed to full-time work opportunities, not constrained by the limitations of seasonal work. Many migrants alluded to seasonal work as the only employment opportunity in their home villages. However, in an urban setting there is full-time work available, whether salary or daily work. There is the opportunity to work every day, throughout the whole year, so individuals can make money and income without unemployment defined by seasons.

Although the prospect of increased wages would otherwise be a positive aspect for migrants in Hlaingtharyar Township, it parallels the fact that other costs within urban centers are more expensive than in migrants' home villages. Most migrants interviewed indicated that although their wage has increased in Hlaingtharyar, it was not enough to cover other expenses. Their overall feeling was that city living was more expensive than their villages; to the point where they had difficulty to afford food with their current salaries. Furthermore, both contract employees and daily workers are subject to lower wages on a whim if factories or other employment opportunities decrease production, which had occurred with numerous interviewees. Even more so, factories are subject to close for consecutive days at a time without any notice required to the workers. If that is the case, then payment ceases for the days the factory is closed.

As an interviewee stated; “[*If the factory closes for five days*] *there will be no food in the house for five days*”. The increase in general costs within Hlaingtharyar constrains migrants although they receive higher wages than would be in their former villages.

Although migrants receive higher wages in Hlaingtharyar, such a guarantee is largely determined on adequate documentation. Interviewees indicated the most difficult situation regarding employment and salary in urban centers is migrants’ access to identification (ID) cards. Interviewees shared that national ID cards are officially required for any formal job. However, most interviewees indicated that they, and other acquaintances, do not hold *appropriate* ID cards. Most migrants do hold ID cards, but interviewees shared that in Myanmar, when an individual or family moves to a new location they are still registered on a required household list in their home village. Therefore, their children, if they have children, would have to register and apply for ID cards in their parents’ home village, since that is where the household list exists. Because of this complexity, numerous individuals fabricate ID cards, which is their access to higher-paid jobs, and the documents needed to acquire the jobs. For example, an interviewee indicated; “*For a higher job many types of documents are needed, and we don’t have*”. The pay discrepancy between individuals with adequate ID cards and those with no ID cards is stark. Interviewees indicated that with ID cards, construction jobs will fetch around 10,000 Myanmar Kyat (7.40 USD) per day, where with no ID card, hard-labor jobs receive 4,500 Myanmar Kyat (3.33 USD) per day; less than half the wage than otherwise would be. Furthermore, a salary job with an ID card can generate anywhere from 130,000 Myanmar Kyat (96.19 USD) to 210,000 Myanmar Kyat (155.39 USD) per month. Therefore, ID cards determine accessibility to higher wage jobs but difficult exists to acquire them due to the constraint of household lists in original villages.

Further constraining migrants are those who take work as daily workers. Associated with this type of work is the uncertainty whether work materializes and the security of wages for people who undertake it. Every daily worker interviewed indicated that they sometimes have work, and sometimes do not; the job guarantee and opportunities are based on employer demand. The inconsistency of work means they may have three to five days of work, then the same duration of time with no work. This provides hardship for both migrants and their families because when out-of-work, finances are limited. Furthermore, employers are known to withhold payments, only to be provided later, which puts the migrants in a financial difficult position.

Daily workers' employment may not be secure, but when they get paid, the finances are better than in their home villages.

For both contracted workers and daily workers, exploitation is ramped within their workplace. For one, ID card issues severely detriment workers. An interviewee shared that although they had a valid ID card, there was a tiny 'blur' on their ID picture. The employer who interviewed them automatically deducted 12,000 Myanmar Kyat (8.88 USD) from their monthly salary. Yet, they had to accept this deduction to work and support their family. In another instance, an interviewee insisted that no matter how long someone works in a factory, they will never make more than 200,000 Myanmar Kyat (148 USD) per month. Due to the fact labor is expendable, factories and employers can control worker's salary. And for daily workers, migrants are at the peril of contractor-intent to pay them or provide fair wages, since they require salary to support themselves and family. Such constraints add to income woes and difficulties.

Although income has increased compared to former area of residence, not all migrants perceive their job situation as an improvement from their home village. Only 12 out of 21 respondents felt their job situation had improved, from both contract workers and daily workers combined. The response demonstrates that nearly half of respondents feel as though their employment position had decreased compared to where they were from.

## **8.2. Housing within Hlaingtharyar Township**

With the influx of migration to Hlaingtharyar Township, housing is a necessity for individuals seeking to improve their livelihoods. The data shows that migrants have the ability to find housing within Hlaingtharyar. The issue with housing lies within nuanced items which play a factor in determining whether their lives have improved or declined compared to their former area of residence. However, there is a clear demarcation between interviewees who lived in certain areas within the Hlaingtharyar Township that were better-off compared to others; those who worked as contract workers compared to daily workers. The areas where, predominantly, interviews took place with daily workers, Ward 5 and Nyaung Village Tract, were termed "slums" by the translator. The area where contract workers chiefly lived, Ward 7, had built-up infrastructure and planned housing districts, whereas the slums exhibited less infrastructure and planning involved within its boundaries. All wards and townships were located near industrial zones, but certain areas still exhibited greater wealth than others.

All interviewees insisted housing is found through family networks through two different means. The first, an individual migrates to an urban center and either close or extended family provides reference on living options. The other is when children, grandparents, or a partner comes to meet a family member already rooted in an urban center. One interviewee made a joke about how every year when they visit their home village for Myanmar's New Year's water festival, they always bring more family and community members back to live with them. However, a consensus showed that housing has potential to be difficult to find. This stems from the fact that when whole families migrate, owners of housing restrict large numbers of children from occupying their accommodation.

Rent difficulties associated with housing continually constrains individuals and families. In slum areas, families indicated they must pay rent to the homeowner. With minimal wages, interviewees asserted their wages do not cover housing rent. The cheapest rent referenced from an interviewee was 19,000 Myanmar Kyat (14.06 USD) for a single-room dwelling made from wood and bamboo, with the highest rent more than doubled at 50,000 Myanmar Kyat (37.00 USD), which constituted a concrete room double the size of a single-room dwelling. The amount of salary and size of family correlated to annual monthly rent cost. However, for every interviewee, housing expenses were a significant struggle with the salary they made from employment. When migrants first arrive to Hlaingtharyar but cannot afford their housing, they must take a loan with 30 percent of the monthly rent-price as an interest rate. Between rent prices set at significant portions of a monthly job salary, and initially high interest rates, many interviewees expressed severe financial hardship associated with rent.

A significant portion of interviewees lived in slums, and had moved from different slums before their current area of residence. A consistent anxiety with their housing situation was the possibility of eviction. Some interviewees had before experienced sudden governmental eviction from former slums. To highlight individuals' worries within slums, an interviewee stated; *"If government says move, we just move. No questions back"*. Interviewees shared that the government announced in 2015 that non-slum areas within industrial zones would remain free from eviction. However, for interviewees in slums, there was a constant state of worry related to possible eviction from their homes. Therefore, interviewees from the slums stated that their largest problem associated with housing was that they always had to move.



With the associated challenges, there has not been marked improvement in housing compared to interviewee home villages. To highlight the point, only 5 out of 22 respondents felt their current housing was secure, and 8 out of 22 felt like their housing had improved from their former area of residence. The majority which did not feel their housing either secure or had improved, considerably feels their housing had declined. As one interviewee stated, which signifies the overall perception of housing to most individuals; *“I live in a pig farm”*. Thus, even before people settle into urban lives they experience hardship from their housing situation.

A common trend related to housing was that the longer an individual or family lives in one area, the more they perceive their housing improves. Therefore, the division between categories of people related to housing exists between short-term and long-term residence within an area. Furthermore, prior perspectives weigh heavily on how individuals currently viewed their housing. For example, an interviewee indicated that prior to urban relocation, they lived *“in a rice field”*. Therefore, that interviewee now perceived their current housing situation as an improvement. The predominant housing difficulties largely related to costs of rent.

### **8.3. Education within Hlaingtharyar Township**

Education opportunities for migrants’ children within urban centers is dependent on both employment and housing. Therefore, education is the most impacted category due to financial constraints. If families become evicted from their homes, children must withdrawal from their education. The impact of financial constraints is highlighted by the stark fact that none of daily workers interviewed could support their child’s education. The daily workers interviewed comprised seven in-depth informant interviews and one focus group interview, consisting of four interviewees. Therefore, a significant divide exists between contracted and daily worker categories related to education for their children.

Overall though, children are able to access education. Out of 22 respondents, 17 indicated that their children had access to education opportunities in Hlaingtharyar Township, while 3 respondents did not have children. In fact, numerous respondents alluded to the fact education is better quality in Yangon and Hlaingtharyar Township merely because their children have access to it, whereas in their former villages children had no access due to distances between home and school, absence of schools, or the financial costs associated with education. Therefore, simply

because migrants' children have access to education in urban centers, the quality of that education has improved.

The largest issue with families that have educational-level children is financial constraints. In Myanmar, education is free for all children, and compulsory, until grade 5 at the end of primary school, or age 10 (Education Policy and Data Center, 2014). However, supplies associated with education, such as books and uniforms, are not free. Therefore, school-supply issues are where migrants struggle to support their children in terms of education. Furthermore, the 'compulsory' aspect of education was often ignored by interviewees due to financial burdens associated with school. Interviewees which had daycare-aged children stated that daycare costs 5,000 Myanmar Kyat (3.70 USD) per month, which is financially unrealistic to support given financial burdens associated with employment and housing. Thus, financial constraints, especially with daily workers, inhibited many interviewees from supporting their children in school. As one interviewee stated; *"Education is better quality here, but you have to have money. If you don't have money, your child falls behind"*. Another interviewee indicated that they had to pull their child out of school for three years because the family could not afford to send them to school. Financial constraints largely detriment migrants' children and their access to education.

Although financial constraints serve as a barrier for migrant families, some families still feel that education quality had improved compared to their home villages. For example, an interviewee indicated that their child had no opportunity for education before they migrated, but now they do in urban centers. There was a mixed response from respondents, where 11 of 21 individuals felt their children's education opportunities had increased, while 3 respondents stated they had no children.

For older children of university age, there is an education scheme in Myanmar which allows them to work and study concurrently. The scheme consists of *distance education*, where students attend university part-time, while at times spatially distant from the physical location of the university, and can still receive a university degree (Tint, 2016). From interviewee responses, there is a notion that their children who partake in distant-education, and receive a university degree, will receive higher wages at a job. In parallel with their distance studies, however, migrants' children undertake work because financial incentives were the initial reason migrant families moved to urban centers. However, even with distance education, the children must, at times, take time off of work for exams. This detracts migrants' children as employers often

shun them in such circumstances. Furthermore, many of the children's priority is employment, so they may enroll and then temporarily quit studies if their family needs a financial boost. To maintain employment and enrollment at university through distance education proves difficult.

## **9. Climate change, vulnerability, and migration**

This chapter begins with a focus on the Ayeyarwady Delta and the issues surrounding climate change, vulnerability, and poverty. Then, the nexus of migration between the Ayeyarwady Delta and Myanmar's urban centers is explored. Such a relationship has concrete push-pull factors, but the underlying factor of migration is poverty. Next, employment, housing, and education for migrants' children are used as indicators to portray and discuss migrant interactions and experiences within urban centers. Finally, protection gaps for the form and scope of migration individuals undertake in this study is examined.

### *Climate change exacerbates poverty:*

The findings reveal that individuals within the Ayeyarwady Delta perceive floods, cyclones, rainfall, pests, and heat to have increased in both frequency and intensity. Such events have severely impacted humans within the last 10 years, but particularly in the last 3 to 5 years. This correlates to the IPCC's (2014) assertion that climate change and its associated disasters have potential to increasingly impact human societies. Therefore, physical changes associated with climate change interlinks with socioeconomic issues intrinsic within society.

The increased intensity and frequency of environmental disasters caused by climate change exacerbates poverty. Environmental disaster negatively impacts individuals' livelihoods. Individuals within the Ayeyarwady Delta already live in poverty. Within the Ayeyarwady Delta, climate change destroys the few assets individuals have, which constitutes the capital they rely on for livelihoods.

The Ayeyarwady Delta's population consists of 86 percent of people in rural settings, and comprises 60 percent of the country's rice production (DPMIP, 2015; Burma River Network, 2016). The findings indicate that climate change and its influence on environmental disasters negatively impact agricultural yields. Warner (2010) indicates that degraded and failing crops directly impacts farmers' earnings. The IPCC (2014) has confidence that climate change negatively impacts the overall agriculture sector. Therefore, when a significant proportion of individuals depend on agriculture, and climate change degrades and destroys crops, poverty amplifies for already impoverished individuals.

Poverty and the gradual degradation of livelihoods morphs into a cycle where individuals become constrained in their hardship and struggle to improve their lives. Yet, the poor are

institutionally marginalized given financial constraints, compounding their plight with little way to mitigate the impacts from a changing climate. Increased climate change lowers crop yields and ushers' endemic poverty in areas already constrained by financial and environmental hardship.

*Poverty is the root cause of vulnerability:*

Just as climate change increases poverty, the most vulnerable people are those living in poverty. The poor are disproportionately affected by climate change and environmental stress (Renaud et al., 2007). Therefore, the poor are most susceptible to be adversely impacted by climate change because they do not have the means to recover from disasters (Krishnamurthy, 2012). When in poverty, the hardship experienced by individuals generate vulnerable situations as there are no economic means to lessen the impacts from environmental disasters.

Within the Ayeyarwady Delta, the findings highlight that the interviewed population lives in poverty and extreme poverty. The people reside in an utmost flat topographic area, subject to their inability, or impossibility, to move elsewhere. As Wisner et al. (2004) indicates, the poor often do not have a choice where they live. The flat topography of the Ayeyarwady Delta exacerbates vulnerability as individuals partake in livelihood activities, but are extremely prone to environmental disasters.

Critically, the relationship between poverty and vulnerability is mutually destructive. Poor individuals inherently exist in a disadvantageous societal position, but vulnerability traps them into poverty. Wisner et al. (2004) shows that cases of vulnerability differ between individuals and environmental hazards, but often vulnerability to one environmental hazard will imply vulnerability to multiple environmental hazards. As McGuigan, Reynolds, and Wiedmer (2002) states, "poorer nations are disproportionately vulnerable to disasters and hence to the effects of climate change" (p.6). When poverty underlies vulnerability, the cycle becomes more debilitating as individuals become increasingly impoverished through an elevated level of vulnerability.

If people were not poor, however, vulnerability could be reduced by diversified livelihoods and lifestyle choices, which financial capital provides. For one, Wisner et al. (2004) confirms that money can provide individuals with options of where to live and a post-disaster recovery mechanism. As slow-onset disasters occur in a rapid, multiply-occurring manner, those disasters will continue to detriment individuals' livelihoods, resulting in decreased financial capital. The people in the Ayeyarwady Delta will not become wealthier, and in fact their

financially constraint will increase. Poor individuals will become more vulnerable, which in turn impoverishes them further.

*Lack of adaptive capacity to climate change:*

The findings indicate that disasters experienced within the Ayeyarwady Delta occur both out-of-season and at an increasingly rapid rate. Therefore, individuals lack adaptive capacity to cope with such events. Kälin and Schrepfer (2012) indicate that slow-onset disasters are the long-term impacts of climate change. Yet, with the increase in frequency and intensity of environmental disasters, as well as multiple environmental disasters occurring in parallel to each other, major time constraints exist to properly cope or adapt with the changing environment. Within the Ayeyarwady Delta, existing adaptation strategies designed to withstand and alleviate disaster impact cannot combat the destructive force of climate change.

Smit and Wandel (2006) state “adaptive capacity is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time. It varies not only in terms of its value but also according to its nature” (p. 287). The case within the Ayeyarwady Delta is no different. Communities throughout the region employ different adaptation strategies to combat environmental disasters exasperated by climate change. The range at which humans can cope to environmental disasters are fluid and relate to economic, social, and political circumstances (Smit & Wandel, 2006). However, attempted adaptation strategies are in their infancy, with insufficient time to address their practicality. Climate change is occurring now, human communities are increasingly impacted from environmental disasters, and the severity of impact outweighs adaptation attempts within the Ayeyarwady Delta.

Most important, there cannot be a demand to force individuals to adapt to climate change within their area of residence. Although the impact from climate change and its associated environmental disasters are extremely severe, it should be an individual’s choice to implement adaptation strategies if they so desire. Options exist in regards to adaptation strategies, but success and usefulness has, largely, yet to prove sufficient. Adaptive capacity for individuals within the Ayeyarwady Delta is unrealistic given the pressing situation of climate change and disasters.

*Financial constraints and incentives as driver of migration:*

Due to deteriorated finances ushered by climate change in the Ayeyarwady Delta, concrete push-pull factors influence both voluntary and forced migration. The findings clearly indicate the push factor for voluntary and forced migrants away from the Ayeyarwady Delta was either a lack of, or non-existent, employment opportunities or degraded livelihood assets, which both correlate with insufficient revenue to support themselves and their family. The Nansen Initiative (2014a) reaffirms this notion by specifically highlighting flood impact on livelihood and economic security, which then influences migration (as cited in Climate Change Adaptation and Migration in the Mekong Delta Workshop Report, 2012). The issue of flood impact on livelihood and economic security can be expanded to other environmental disasters.

Conversely, the pull factor to new locations in Myanmar is increased job opportunities, which results in available and improved wages. From the findings, the pull factor always leads individuals into Myanmar's urban centers. The main driver of migration and the pull to urban centers is socio-economic factors, since migrants often have increased economic opportunities in cities (Crisp & Refstie, 2011; Lein, 2010). Whether expressed through a voluntary migration or forced migration rhetoric, the findings clearly show that decreased capital from environmental disasters drive migration patterns, especially to Myanmar's urban centers.

Migration is undertaken by individuals as an adaptation strategy to improve lives, which in the case of Myanmar involves increased economic opportunity. The findings clearly show that individuals from the Ayeyarwady Delta seek higher economic means when confronted with tangible dwindling finances. Such is demonstrated by those in Myanmar's Chaungzon Township and Hlaingtharyar Township, as individuals sought places to increase economic opportunities. Kiang (2015) expresses that cities can reduce poverty in both rural and urban settings by functioning as economic centers, and distributing wealth through physical and social links within society. Individuals in the Ayeyarwady Delta do not possess or have opportunities to increase economic means, but cities provide them with an opportunity to make money.

Indications suggest the reason Yangon's population doubled between 1973 to 2014, and Myanmar's 10-largest cities are currently growing in population, is because people migrate to cities and industrial zones in search of employment opportunities. Such a pattern follows the United Nations Department of Economic and Social Affairs (2014) findings that the worldwide urban population grew from 30 percent in 1950 to 54 percent in 2014. In Asia, 48 percent of the population still lives in rural settings, but by 2050 it is expected that population will drop to 36

percent, with most the population residing in urban centers (United Nations Department of Economic and Social Affairs, 2014). Therefore, the findings indicate that migration to urban centers will continue as individuals seek increased economic opportunities, in which case urban populations will continue to grow.

In the future, less people in Myanmar will reside in rural settings as climate change worsens their economic situation. Current trends indicate that more people will seek an improved livelihood in urban centers because of economic opportunity there. However, Khaing (2015) shows that an influx of individuals already strain city amenities, including employment. As more people migrate to urban centers in search of employment, higher demand will be put on services and possibly constrain access to employment, which is the fundamental reason individuals migrate.

*Hardship for migrants within urban centers:*

Individuals will migrate to urban centers with financial incentives although it will intensify their hardship. Individuals migrate to Myanmar's urban centers for employment opportunities, but largely encounter both housing and education opportunities deteriorated compared to their home villages. The findings highlight that employment and housing marginalize and constrain migrant's lives within urban centers, which entraps them in poverty, while poverty and wages determine education opportunities for migrants' children.

Employment, housing, and education for migrants' children were used as indicators to evaluate both wellbeing and improvement for migrant lives in urban centers. Employment is the most prioritized aspect of rural-urban migration. Therefore, urban centers are opportune in the sense that migrants have access to employment, and thus fractionally improve earnings. However, most jobs available to migrants are exploitative and demeaning, while both housing and education for migrant's children are generally diminished compared to their prior lives.

Because numerous migrants cannot receive proper documentation for employment, the regulations set against them marginalizes them to a certain stigma within society. In Myanmar's urban centers, the determining factor which guarantees children access to education is their parent's employment. If finances within a household are limited, the costs associated with education will be deprioritized. According to the World Bank Group (2015b), employment can



exacerbate inequalities by denying additional services to migrants. Given the current hardship faced by migrants, difficulties exist to reduce their poverty (Crisp & Refstie, 2011).

Most migrants interviewed within urban centers indicated that if they thought it was possible, they would have remained in the Ayeyarwady Delta. As one interviewee in Hlaingtharyar stated in relation to their urban experience; *“I expected a better life, a better life. But the situation is only here, so no better chance”*. Given both the current environmental and employment situation in the Ayeyarwady Delta, many challenges exist to minimize migration and create a situation where individuals can remain there. If jobs could be created or investment in agriculture could take place, more people would probably have preferred to stay in the Ayeyarwady Delta and not have migrated for work opportunities other places. According to the Food and Agriculture Organization of the United Nations (FAO) (2017) in the case of Syria, 94 percent of communities surveyed felt that increased support into the agriculture sector would reduce migration. The FAO’s finding from Syria might also be applicable for Myanmar. Therefore, the necessary aspects to incentivize individuals from migrating away from the Ayeyarwady Delta comprises the ability to support agricultural development. There could be ways to support and sustain agriculture in the face of increased climate change impact, by using better technologies and supplying better services to farmers. Consequently, a decent income can be made from agriculture.

Nevertheless, the Ayeyarwady Delta faces monumental environmental challenges. People throughout the Ayeyarwady Delta question their future while young people particularly view their future as located outside of the Ayeyarwady Delta, and in Myanmar’s urban centers. Although demanding, attempts should be made to support the people in the Ayeyarwady Delta who want to stay there, to maintain their lives and livelihoods. If job incentives exist and are reliable, the drive to migrate could reduce. It is necessary to make all people, and particularly the young, not feel like they are forced to migrate elsewhere for increased economic opportunities.

*Gaps for protection in existing legal frameworks:*

An institutionalized hierarchy exists on protection within the international community when confronting issues of displacement and migration related to climate change and environmental harm. The most significant displacement-related policy is the UNHCR's 1951

Refugee Convention and its 1967 Protocol. That policy binds States to uphold protection for refugees. The protocol defines a refugee as a person who

Owing to well- founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it. (UNHCR, 2010, p. 14)

However, the protocol and UNHCR's definition proves unfounded and irrelevant to protect individuals displaced, or individuals migrating, from environmentally-related causation. The framework of the protocol was not set up to acknowledge such persons, as it intends to protect those displaced by conflict and war. Ultimately, efforts to place climate change-induced migrants or displaced persons within the bounds of the Refugee Protocol is unfeasible (Kolmannskog, 2008).

Migrants and IDPs are excluded under the Refugee Protocol, but still require attention to support their livelihoods. The UN clarifies that 'IDP' is itself not a legal term, but many legal systems have increasingly recognized IDPs plight (Kolmannskog, 2008). The most important recognition of IDPs is the United Nations Commission on Human Rights (UNCHR) 1998 Guiding Principles on Internal Displacement. Rather than creating a separate convention for internal displacement, Kolmannskog (2008) shows that the guiding principles "[are] a synthesis, drawing out relevant parts of human rights law, refugee law by analogy and international humanitarian law / laws of war [*sic*]" (p. 29). Although the Guiding Principles are not legally-binding, they nonetheless provide the most extensive protection for IDPs displaced by environmental factors. The UNCHR (1998) defines,

Internally displaced persons are persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border. (p. 5)

The Guiding Principles were the first to establish natural or human-made disasters as a mechanism to drive displacement. However, the measures to protect IDPs fall on the State. Since the Guiding Principles are not legally binding, in practice, States may ignore such requirements to protect IDPs. The Guiding Principles do provide reference when internal displacement occurs within States but lack weight given its absence of a legally-binding status.

At the bottom of the protection hierarchy, however, are migrants who undertake migration as an adaptation strategy to escape climate change impact on their livelihoods. Although poverty is the root cause of vulnerability, in parallel, climate change and climate variability acts as a root cause of the vulnerability. Climate change both increases poverty and triggers migration, while no protective measures are in place to protect such persons. The latest, and regarded as a groundbreaking, convention on climate change was the United Nations Framework Convention on Climate Change (UNFCCC) adoption of the Paris Agreement. However, even in this seemingly comprehensive protocol addressing issues of climate change, climate migration is excluded from the protocol. The closest the agreement comes to addressing *any* sort of climate change-induced displacement or migration is in paragraph 50, when the parties merely *request* a mechanism which aims to “avert, minimize and address displacement related to the adverse impacts of climate change” (UNFCCC, 2015, p. 50). In the way of protection, it appears weak in a document established purely to confront climate change and its associated challenges. Therefore, this agreement did little to confront the phenomenon of climate change-induced displacement or migration.

Unfortunately, voluntarily migrants, forced migrants, and IDPs who move due to climate change fall into a disadvantageous category. Pressure continually mounts on States to accept and provide care for displaced persons given the amount of conflict and environmental disasters in the world. However, McAdam (2011) demonstrates that "states presently seem to lack the political will to negotiate a new instrument requiring them to provide international protection to additional groups of people" (p. 14-15). Even more so, McAdam (2011) feels that even if a treaty could be developed to protect climate change-induced displaced persons or migrants, its ratification, implementation, and enforcement by States would prove impossible.

## 10. Conclusion

Climate change increases the frequency and intensity of environmental disasters within the Ayeyarwady Delta. The people within the Ayeyarwady Delta are dependent on their environment through livelihoods rooted in agriculture, but in turn, the environment subjects humans to its natural forces. Specific environmental disasters that individuals face in the Ayeyarwady Delta include flooding, cyclones, rainfall, pests, and heat. Therefore, environmental disasters directly impact individual livelihoods, and communities alike. Because environmental disasters degrade livelihoods, migration occurs due to increased poverty. People in poverty are more vulnerable to climate change as adaptation mechanisms lack. More people migrate away from the Ayeyarwady Delta because of diminished livelihood prospects in search of economic opportunity in urban centers.

Employment, housing, and education for migrants' children presents a complex array of categories to assess and evaluate individuals' lives in Myanmar's urban centers. Each category serves as an indicator for migrants' urban experience. Migrants *can* find employment in Myanmar's urban centers, but certain factors such as appropriate and adequate documentation determine if migrants have contracted employment or daily work. Migrants can also find housing predominantly through family networks. Furthermore, migrants' children have access to education, in the sense that education opportunities purely exist. However, the *ability* to send children to school is dependent on parents' employment opportunities, as well as overall household economic standing.

The distinction and categorization between voluntary and forced migration is not expressive of the phenomena being researched. In Myanmar's Ayeyarwady Delta, both climatic pressures and economic pressures exist. Both voluntary and forced migration from the Ayeyarwady Delta occur, but such a distinction proves insufficient to categorize people who migrate in the face of climate change. The type of migration which occurs encapsulates both climate and economic components; the two exist in a mutually reinforcing relationship. In the context of the Ayeyarwady Delta, poverty is the root cause of migration while climate change is the trigger of migration; both compound to generate the migration which transpires. The two factors are interlinked and such people comprise *climate-induced economic migrants*.

Increasing numbers of humans will fall under the category climate-induced economic migrants as climate change continues to impact humans and society. To confront climate-induced

economic migrants, Myanmar must establish national policy to assist farmers in sustaining agricultural crops and in confronting climate change. Farmers must have support to confront the changing climate, and the ability to make money from crops. Furthermore, Myanmar's urban policy must recognize the hardship climate-induced economic migrants experience in urban centers. Such changes could comprise the assistance and easier access to necessary documents for contracted employment, policy on increased worker's protection, affordable and fair housing projects, and subsidies to migrants' children for school supplies. The international community must also recognize and confront climate-induced economic migrants as greater numbers are likely to increase in the future. It is inadequate and unjust that climate-induced economic migrants have to take full responsibility for a problem they did not create. There is no justice or validity to sit back and wait for hardship to compound for these people. Climate-induced economic migrants deserve recognition, action, and integrity from all tiers of society.



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## Appendices

### Appendix 1: Interview guide for in-depth and focus group semi-structured interviews in the Ayeyarwady Delta

#### Background Information

1. ID #:
2. Date:
3. Location of interview:
4. Gender:
5. Age:
6. Do you live in this village?
  - a. If not, where do you live?
7. Were you born where you live?
  - a. If not, when did you move here?
8. What material is your house made of?
9. Do you own your own land? (Customary law, legal ownership; do you have papers?)
  - a. If yes, how long have you owned it?
  - b. If no, who owns it and how do you manage the land?
10. Did you go to school?
  - a. If yes, which level did you complete?
11. What is your occupation?
  - a. Agriculture:
    - i. What crops do you grow?
    - ii. What is the size of the agriculture crop?
    - iii. Is the product for sale or home-consumption?
      - i. For sale; do you work another job to gain more money?
  - b. Other
12. How many individuals live in your household?
13. Do you have children? If so, how old are they?
  - a. (If age appropriate) do they go to school?
    - i. If so, what level are they?

#### Changes in flooding trends and patterns

14. Do river floods impact your occupation?
  - a. If so, in what way(s)?
    - i. If crops, what trends have been noticed the last 10 years (reduction in crop yields, food systems break down)?
  - b. If not, do they impact others in your household?
15. Does river flooding pose a risk to you or your family?
  - a. If so, in what ways?
16. What people do you feel are most affected by river floods?
  - a. Why do you feel that such people are affected more?
17. Do river floods *negatively* impact more people than they used to?
  - a. If yes;
    - i. In what ways are people impacted?

- ii. Why does flooding impact them more now than before?
- iii. How do people respond to such impact?

### **Climate change and its impact on river flooding events**

- 18. Have you noticed a change in river flooding events in the past 10 years?
  - a. What changes have you noticed?
  - b. Do you believe floods have increased in frequency?
  - c. Do you believe floods have increased in intensity?
- 19. *If applicable*, why do you feel river flooding has increased in frequency and intensity?
- 20. Are annual/seasonal floods predictable or unpredictable?
  - a. Is this because of changes in rainfall patterns?
- 21. Have rainfall patterns changed to impact river flooding events?
  - a. How have they changed?
  - b. Do you believe floods have increased in frequency?
  - c. Do you believe floods have increased in intensity?
- 22. Do single flood-events or recurrent floods cause the biggest harm?
  - a. Depending on answer, why do they believe this to be the case?
  - b. What is the consequence of this type of flood?
- 23. Have floods impacted more people in the past 10 years compared to before?
- 24. In what ways have floods impacted more people?
- 25. Do you recognize the term ‘climate change’?
  - a. If yes, do you feel climate change has influenced river flooding?
- 26. Is recurrent flooding discussed between people and villagers here?
  - a. What is talked about?
- 27. How do others within the (*village/community*) view river flooding?

### **Flooding impact on individuals and households**

- 28. What strategies do you employ to confront flooding threats?
- 29. Are these measures successful?
  - a. If so, what makes them successful?
  - b. If not, why do they fail?
- 30. How long have people implemented such measures to confront flooding threats?
- 31. In the past 10 years, have floods destroyed...?
  - a. Your home
  - b. Your crops/area of occupation (whatever is applicable)
  - c. Your children’s’ school
  - e. Other structures
- 32. Do floods make residing in this area difficult?

### **Flooding as a driver of forced migration**

- 33. Have you migrated to other villages because of river floods?
  - a. Is this seasonal labour, or escaping flood threat?
- 34. Have you migrated to Yangon because of river floods?
  - a. If so, when and for how long?
- 35. Have you migrated to other Urban Centers because of river floods?
  - a. If so, where, when, and for how long?
- 36. Have you ever migrated away from this village for any reason other than floods?



- a. If so, why and for how long?
- 37. If you move, how soon do they return to this village?
- 38. *If they have migrated*, what pulls/attracts them to Yangon/Urban Centers?
- 39. Do you know others who have migrated to Yangon because of river floods?
  - a. If yes;
    - i. How many?
    - ii. What was there age?
    - iii. Did they return?
- 40. Have you ever felt forced to migrate away from this village?
- 41. How would you define ‘forced migration’?
- 42. Have floods played a part to increase migration from the Delta?
  - a. If yes, where do the people go?
- 43. What allows people to migrate? (If one wants to migrate, how do they do it?)
- 44. What opportunities exist outside of the Delta to influence others to migrate?
- 45. If people migrate, do they return?
  - a. If yes,
    - i. How often do they return?
    - ii. What type of work do they participate in?
  - b. If no, why do they stay?
- 46. *What employment opportunities exist if one decides to migrate?*
- 47. *What housing options exist if one decides to migrate?*
- 48. *What education options exist for children if one decides to migrate?*
- 49. How are migrants from the Ayeyarwady Delta received by city residents when they migrate to Yangon/Urban Centres?

### **Multi-causal Reasons for Migration**

- 50. (Other than floods) what factors make growing crops difficult in this area?
- 51. How does flooding impact infrastructure (crops, homes)?
- 52. Has increased sedimentation occurred from river floods?
  - a. How does this impact crops?
  - b. How does this impact your livelihood?
- 53. Has pests increased due to river floods?
  - a. Are they the same pests or new pests as experienced before?
  - b. How do the pests impact crops?
- 54. Do their children have access to education?
- 55. When people become sick or injured, where is the nearest hospital?
- 56. How much money do they make from their occupation?
  - a. *Has flooding impacted their annual amount of money made (increase or decrease)?*

### **Progression of vulnerability**

- 57. How do you make household decisions?
- 58. How do you make village decisions here?
- 59. Are there ways to participate at a State or National level in decision making processes?
  - a. What is their access to power?
- 60. Are there any external investments or campaigns to confront flooding threats?
- 61. Has the population increased in this village in the last 10 years?
- 62. Have more people moved to this village in the last 10 years?

63. Have (your) crops continued to be productive over the last 10 years?
64. Is your home located in an unsafe location?
65. Are your crops located in an unsafe location?
  - a. Does this risk your means of economic security?
66. Is there Division or National support to protect crops/house from river flooding?

**Other issues**

67. Have you migrated in the past for any reason other than floods?
  - a. If yes,
    - i. Why did you migrate?
    - ii. Did migration fill the need for your reason?
68. *What do you think are the main challenges that this community faces?*

**Concluding questions**

69. Do you know anyone who migrated from the Delta now in Yangon?
  - a. If yes, would you mind if I contacted them to meet during that part of research?
70. Do you have anything else you would like to add to this topic?
71. Do you have any questions for me?

**Appendix 2: Interview guide for key informant interviews in the Ayeyarwady Delta**

1. ID #:
2. Date:
3. Location of interview:

**Changes in flooding trends and patterns**

4. What is the largest environmental threat to humans in the Ayeyarwady Delta?
  - a. Why is this the largest threat?
  - b. How does it impact humans residing in the Ayeyarwady Delta?
5. Have you noticed changes in river flooding events in the Ayeyarwady Delta over the last 10 years?
  - a. If so, what changes have you noticed?
6. How are humans impacted when river flooding occurs?
7. Within the Delta, where are people most affected by floods?
  - a. What makes these places ‘at risk’ areas for flooding?
8. Are floods predictable or unpredictable?

**Flooding impact on individuals and households**

9. What strategies do different categories of people employ to confront flooding threats?
  - a. Are these strategies successful?
    - i. If so, what makes them successful?
10. Do floods make residing in the Ayeyarwady Delta difficult for individuals?

**Climate change and its impact on river flooding events**

11. Have you noticed a change in river flooding events in the past 10 years?
  - a. If yes;
    - i. What changes have you noticed?
    - ii. Do you believe floods have increased in frequency?
    - iii. Do you believe floods have increased in intensity?
12. How has climate change impacted individuals vulnerable to river flooding events?
13. Do single flood-events or recurrent floods cause the biggest harm? Why?
14. Are changes in river flooding events discussed within the Ayeyarwady Delta?
  - a. If so, what is talked about?
15. Is a changing climate discussed within the Ayeyarwady Delta?
  - a. If so, what is talked about?

### **Flooding as a driver of forced migration**

16. Do you feel flooding events impact human migration?
  - a. If so, in what ways?
17. Have more people migrated away from the Ayeyarwady Delta because of river floods?
  - a. If so, where do they go?
18. What are other reasons (other than floods) that people have moved away from the Ayeyarwady Delta?
19. What draws people to other places?
20. When/if people migrate, why do they chose Urban Centers to relocate to?
21. Do you think people are forced to move from the Delta because of river floods?
  - a. If so, how do you define forced migration?

### **Progression of vulnerability**

22. Does peoples' vulnerability influence how environmental threats impact them?
  - a. If so, in what ways?
23. Have livelihood activities (crops) continued to be productive due to river floods?

### **Other issues**

24. What do you feel has been the largest impact within the Ayeyarwady Delta caused by river floods?
25. What do you think are the main challenges within the Ayeyarwady Delta due to a changing climate?

### **Concluding questions**

26. Do you have anything else you would like to add to this topic?
27. Do you have any questions for me?

### Appendix 3: Questionnaire for the Ayeyarwady Delta

#### Questionnaire Ayeyarwady Delta:

1. Source of income/livelihood?: \_\_\_\_\_
2. Do you feel river flooding poses a risk to you?: Yes \_\_\_\_ No \_\_\_\_
3. Do you feel river flooding poses a risk to your community?:  
Yes \_\_\_\_ No \_\_\_\_
4. Do you or your community develop strategies to minimize the impact from river flooding?:  
Yes \_\_\_\_ No \_\_\_\_
5. Have you noticed an increase in the frequency of river flooding events over the last 10 years?:  
Yes \_\_\_\_ No \_\_\_\_
6. Do you think that river flooding has negatively impacted people within the community?:  
Yes \_\_\_\_ No \_\_\_\_
7. Have you noticed an increase in the intensity of river flooding events over the last 10 years?:  
Yes \_\_\_\_ No \_\_\_\_
8. Have you ever been *forced* to move away from home because of river flooding?:  
Yes \_\_\_\_ No \_\_\_\_
9. Have you ever *voluntarily* moved away from home because you felt that river flooding would increase in the future?:  
Yes \_\_\_\_ No \_\_\_\_
10. Do people within your community move away because of the risk from river flooding?:  
Yes \_\_\_\_ No \_\_\_\_

**Appendix 4: Translation of questionnaire for the Ayeyarwady Delta**

ဧရာဝတီတိုင်းဒေသကြီးအတွင်း နေထိုင်သူများအား မေးမြန်းခြင်း

၁။ လက်ရှိဝင်ငွေရရှိလျက်ရှိသော အလုပ်အကိုင်/အသက်မွေးမှု \_\_\_\_\_

၂။ မြစ်ရေကြီးမှုကြောင့် သင့်အပေါ် အကျိုးသက်ရောက်မှုများ ခံစားရပါသလား။

ခံစားရသည် \_\_\_\_\_ ၊ မခံစားရပါ \_\_\_\_\_

၃။ မြစ်ရေကြီးမှုကြောင့် သင့်ပါတ်ဝန်းကျင်လူထုအပေါ် အကျိုးသက်ရောက်မှုများကို ခံစားရပါသလား။

ခံစားရသည် \_\_\_\_\_ ၊ မခံစားရပါ \_\_\_\_\_

၄။ သင် (သို့) သင့်ပါတ်ဝန်းကျင်လူထုတွင် မြစ်ရေကြီးမှုနည်းပါးအောင် ကာကွယ်နိုင်ရန် အစီအမံများရှိပါသလား။

ရှိသည် \_\_\_\_\_ ၊ မရှိပါ \_\_\_\_\_

၅။ (၁၀)နှစ်အတွင်း မြစ်ရေကြီးမှုအကြိမ်ရေ တိုးများလာသည်ကို သတိပြုမိပါသလား။

သတိပြုမိသည် \_\_\_\_\_ ၊ သတိမပြုမိပါ \_\_\_\_\_

၆။ (၁၀)နှစ်အတွင်း မြစ်ရေကြီးမှုအလားအလာ တိုးများလာသည်ကို သတိပြုမိပါသလား။

သတိပြုမိသည် \_\_\_\_\_ ၊ သတိမပြုမိပါ \_\_\_\_\_

၇။ မြစ်ရေကြီးမှုကြောင့် နေအိမ်မှ အတင်းပြောင်းရွှေ့ နေထိုင်ခဲ့ဖူးပါသလား။

နေထိုင်ခဲ့ဖူးပါသည် \_\_\_\_\_ ၊ မနေထိုင်ခဲ့ဖူးပါ \_\_\_\_\_

၈။ မြစ်ရေကြီးမှုက တစ်ချိန်ချိန်မှာ ပိုတိုးလာနိုင်သည်ဟုထင်ပြီး ယခုနေရပ်မှ ပြောင်းရွှေ့သွားဖို့ စိတ်ကူးမိပါသလား။

စိတ်ကူးမိသည် \_\_\_\_\_ ၊ စိတ်မကူးမိပါ \_\_\_\_\_

၉။ မြစ်ရေကြီးမှုသည် ရပ်ရွာလူထုအပေါ် မကောင်းကျိုးသက်ရောက်မှုရှိနေသည်ဟု ထင်မြင်ပါသလား။

ထင်ပါသည် \_\_\_\_\_ ၊ မထင်ပါ \_\_\_\_\_

၁၀။ စိုးရိမ်စရာ မြစ်ရေကြီးမှုကြောင့် သင့်ပါတ်ဝန်းကျင်ရပ်ရွာလူထုများ ပြောင်းရွှေ့သွားကြပါသလား။

ပြောင်းသွားသည် \_\_\_\_\_ ၊ မပြောင်းကြပါ \_\_\_\_\_

၁၁။ ကျား \_\_\_\_\_ မ \_\_\_\_\_

(Translated by Nay Lin Kyaw)

## **Appendix 5: Interview guide for in-depth and focus group semi-structured interviews in Yangon Region and Mon State**

### **Background Information**

1. ID #:
2. Date:
3. Location of interview:
4. Gender:
5. Age:
6. Where were you born?
  - a. How long did you live there before migrating?
7. How long have you lived here?
8. Did you go to school?
  - a. If yes, what level did you complete?
9. What is your occupation?
10. Do you have children? If so, how old are they?
  - a. (If age appropriate) do they go to school?
    - i. If so, what level are they?
11. How many individuals live in your household?

### **Reasons for migration**

12. Why did you migrate to this city?
13. In your home town, what was the biggest environmental threat?
14. Did the (specific) environmental threat influence your decision for migration?
  - a. If so, in what ways?
  - b. If not, did environmental impacts influence others to migrate?
15. Do you feel the environmental threat has increased in frequency and intensity?
16. Did you feel forced to migrate, or did you voluntarily migrate, away from your home?
17. (1<sup>st</sup> - dependent on answer above) How do you define ‘forced migration’?
18. (1<sup>st</sup> - dependent on answer above) How do you define ‘voluntary migration’?
19. How many people migrated away from your home town?
  - a. Are they your same age? If not, what age are they?
  - b. Is it both men and women?

### **Employment**

20. What employment opportunities exist if one decides to migrate?
21. How did you find your current job?
  - a. Was it easy to become employed?
22. How long did it take to find your job?
23. Did you have any assistance to find a job?
  - a. If so, what/who assisted you (public or private)?
24. Are jobs readily available for people who migrate (to this city)?
25. *Has your income improved or declined (in this city) from you home?*
  - a. Can you support yourself with the salary you make?
  - b. Can you support your family with the salary you make?
26. How did environmental hazards influence employment opportunities in your home town?

- a. Did environmental hazards impact employment opportunities in your home town?
- 27. What are the largest challenges facing you in your workplace?

### **Housing**

- 28. What housing options exist if one decides to migrate?
- 29. How did you find your current house?
  - a. Was it easy to find housing?
- 30. How long did it take to find your house?
- 31. Did you have any assistance to find a house?
  - a. If so, what/who assisted you (public or private)?
- 32. Is housing readily available for people who migrate (to this city)?
- 33. *Has your housing improved or declined (in this city) from your home?*
- 34. Do you live with others?
  - a. If yes, how many?
  - b. If yes, who else lives in your home?
- 35. How did environmental hazards influence housing opportunities in your home town?
  - a. Did environmental hazards impact housing opportunities in your home town?
- 36. What are the largest challenges facing you to find housing in urban centers?

### **Education (will alter depending on if they have children; IF NOT, what do they do)**

- 37. What education options exist for children if one decides to migrate?
- 38. (If they have children) How does this compare to your home?
- 39. Do your children attend school?
  - a. If so,
    - i. How did you find a school for your children?
    - ii. Was it easy to find a school?
    - iii. Was there assistance to help find a school for your child. (public or private)?
      - i. If yes, what/who assisted you (public or private)?
  - b. If not,
    - i. Would you like your children to attend school?
    - ii. How would this be possible?
- 40. Do education opportunities exist for migrant's children?
- 41. Is children's education prioritized for migrants who come (to this city)?
- 42. *Has your child's education improved or declined (in this city) from your home?*
- 43. How did environmental hazards influence children's access to education in your home town?
  - a. Did environmental hazards impact education opportunities in your home town?
- 44. What are the largest challenges facing your children in terms of access to education?

### **Overall migration**

- 45. What pulled/attracted you to (this city)?
- 46. Why did you leave their home city?
- 47. How did you learn about migration options?
- 48. Did you have a network to contact before migrating?
- 49. How did you migrate (If one wants to migrate, how do they do it?)
- 50. How were they able to afford migration?
- 51. Are you able to save money?
- 52. Do environmental hazards impact you here?

- a. If yes, in what ways?
- 53. What age group migrates to urban centers?
- 54. Once individuals migrate to urban centers, do they return home or remain in cities?
- 55. What are the largest threats to migrants in urban centers?

**Other issues**

- 56. Will you return home (temporarily, ever, permanently)?
- 57. If other people migrate, do they return home?
- 58. Have you migrated in the past for any reason?
  - a. If yes,
    - i. Why did you migrate?
    - ii. Did migration fill the need for your reason?
- 59. *What are the main challenges that you face after migration (here)?*
- 60. Are you satisfied with your employment situation?
- 61. Are you satisfied with your housing situation?
- 62. Are you (or other people) satisfied with your (their) children’s education opportunities?

**Concluding questions**

- 63. Do you have anything else you would like to add to this topic?
- 64. Do you have any questions for me?

**Appendix 6: Interview guide for key informant interviews in Yangon Region and Mon State**

**\* Alter based on city!**

- 1. ID #:
- 2. Date:
- 3. Location of interview:

**Reasons for migration**

- 4. Do you feel that migration to Myanmar’s urban centers is increasing?
  - a. If so, what do you feel drives this migration (What factors pull migrants to the city?)
  - b. If so, does this strain existing migrants access to employment, housing, and ed. (child)?
- 5. Do you believe environmental hazards in these individuals’ home townships influence migration?
  - a. If so, in what ways do you feel this drives migration?
- 6. What are your thoughts on climate change increasing environmental hazards frequency and intensity, and that influence on migration?
- 7. Do you think these people are forced to migrate, or migrate voluntarily?
- 8. (1<sup>st</sup> - dependent on answer above) How do you define ‘forced migration’?
- 9. (1<sup>st</sup> - dependent on answer above) How do you define ‘voluntary migration’?

**Employment**

- 10. What employment opportunities exist if one decides to migrate?
- 11. How do migrants find employment once in urban centers?



12. Are there services, either public or private, which assist in their search for employment?
13. Do you think migrant's income improves or declines in the city compared to where they come from?
14. Are salaries sufficient to elevate their, and their families, standard of life?
15. What are the largest challenges facing migrants to find employment in urban centers?
16. What are the largest challenges facing migrants in their workplace?

### **Housing**

17. What housing options exist if one decides to migrate?
18. How do migrants find housing once in urban centers?
19. Are there services, either public or private, which assist in their search for housing?
20. Do you think migrant's housing improves or declines in the city compared to where they come from?
21. What are the largest challenges facing migrants to find housing in urban centers?

### **Education**

22. Are migrants children able to access education in the city?
23. Are there services, either public or private, which assist in migrants children accessing education?
24. What education options exist for children if one decides to migrate?
25. Do you think migrant's children education improves or declines in urban centers from their home?
26. What are the largest challenges facing migrants children in terms of access to education?

### **Overall migration**

27. What attracts migrants to the city?
28. What pushes migrants away from their home?
29. How are migrants able to afford migration?
30. Do migrants return home (temporarily, ever, permanently)?
31. Do you think environmental hazards threaten migrants in urban centers?
32. If migrants experienced vulnerability beforehand, do urban centers reduce such vulnerability?
33. What age group migrates to urban centers?
34. What are the largest threats to migrants in urban centers?

### **Other issues**

35. What do you feel has been the largest *impact* within Myanmar's urban centers because of forced migration?
36. What do you feel is the main *challenge* within Myanmar's urban centers because of forced migration?

### **Concluding questions**

37. Do you have anything else you would like to add to this topic?
38. Do you have any questions for me?

## Appendix 7: Questionnaire for Hlaingtharyar

### Questionnaire Urban Centers:

1. Source of income/livelihood: \_\_\_\_\_
2. Male \_\_\_\_\_ Female \_\_\_\_\_
3. Age \_\_\_\_\_
4. Which township did you migrate from: \_\_\_\_\_
5. Reason(s) for migrating here: \_\_\_\_\_
6. Do you *currently* have a secure job?  
Yes \_\_\_\_\_ No \_\_\_\_\_
7. Has your job situation improved from your former area of residence?  
Yes \_\_\_\_\_ No \_\_\_\_\_
8. Do you *currently* have secure housing?  
Yes \_\_\_\_\_ No \_\_\_\_\_
9. Has your housing situation improved from your former area of residence?  
Yes \_\_\_\_\_ No \_\_\_\_\_
10. Are your children able to access education?  
Yes \_\_\_\_\_ No \_\_\_\_\_ I have no children \_\_\_\_\_
11. Has your children's education opportunities increased?  
Yes \_\_\_\_\_ No \_\_\_\_\_ I have no children \_\_\_\_\_
12. Do you feel that more people continue to migrate/move to urban centers?  
Yes \_\_\_\_\_ No \_\_\_\_\_

Appendix 8: Translation of questionnaire for Hlaingtharyar

ကျေးလက်ဒေသမှ မြို့ပြသို့ ပြောင်းရွှေ့အခြေချ ခြင်းကို လေ့လာခြင်း

၁။ အသက်မွေးဝမ်းကြောင်းလုပ်ငန်း \_\_\_\_\_

၂။ ကျား \_\_\_\_\_ ၊ မ \_\_\_\_\_

၃။ အသက် \_\_\_\_\_

၄။ ဘယ်မြို့နယ်ကနေပြောင်းလာတာလဲ \_\_\_\_\_

၅။ ဘာဖြစ်လို့ပြောင်းလာတာလဲ \_\_\_\_\_

၆။ အခုအလုပ်အတည်တကျရှိနေပြီလား။

ရှိပါတယ် \_\_\_\_\_ ၊ မရှိသေးပါ \_\_\_\_\_

၇။ ယခုအလုပ်အခြေအနေက အရင်နေခဲ့တဲ့နေရာကထက် ပိုကောင်းလာပါသလား။

ကောင်းပါတယ် \_\_\_\_\_ ၊ မကောင်းပါဘူး \_\_\_\_\_

၈။ ယခုနေရာအိမ်အတည်တကျရှိနေပြီလား။

ရှိပါတယ် \_\_\_\_\_ ၊ မရှိသေးပါ \_\_\_\_\_

၉။ ယခုနေအိမ်က အရင်နေခဲ့တဲ့နေရာကထက် ပိုကောင်းလာပါသလား။

ပိုကောင်းပါတယ် \_\_\_\_\_ ၊ ပိုမကောင်းပါ \_\_\_\_\_

၁၀။ ကလေးတွေကျောင်းနေထိုင်ခွင့်ရကြပါသလား။

ရပါတယ် \_\_\_\_\_ ၊ မရပါဘူး \_\_\_\_\_ ၊ ကလေးမရှိပါ \_\_\_\_\_

၁၁။ ကလေးတွေ ပညာသင်ခွင့် ပိုအစဉ်ပြေလာပါသလား။

ရပါတယ် \_\_\_\_\_ ၊ မရပါဘူး \_\_\_\_\_ ၊ ကလေးမရှိပါ \_\_\_\_\_

၁၂။ ကျေးလက်ဒေသနေလူတွေက မြို့ပေါ်ကိုအရင်ကထက်ပိုပြီးတော့ ပြောင်းလာကြမယ်လို့ထင်ပါသလား။

ထင်ပါတယ် \_\_\_\_\_ ၊ မထင်ပါဘူး \_\_\_\_\_

(Translated by Nay Lin Kyaw)