Analyzing Relationships between Reconstruction Approaches and Social Vulnerabilities in Tsunami-Affected Thailand

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Abstract

Following the destruction of the 2004 tsunami in Thailand, a major reconstruction effort was undertaken. This project investigated the relationships between the reconstruction approaches used by organizations and the social vulnerabilities villagers experienced in Thailand following the reconstruction effort. We found that certain reconstruction approaches resulted in houses that did not meet villagers' needs and increased their vulnerabilities. Recommendations were made to government agencies and NGOs for improving future reconstruction efforts and to researchers to explore gaps in knowledge.

Executive Summary

On December 26, 2004 a tsunami struck the southwest coast of Thailand, causing many casualties and much destruction of infrastructure across six provinces in Southern Thailand – Ranong, Phang Nga, Phuket, Krabi, Trang, and Satun. Immediately following the tsunami, relief organizations, including both NGOs and the Thai government, began rebuilding the affected area. The goal of this project was to understand the relationships between the approaches used by organizations to plan and implement the reconstruction and changes to villagers' social vulnerabilities that are associated with the reconstruction. Also, we wanted to identify important social demographics that have influenced the changes in social vulnerabilities brought about by the reconstruction effort.

In the context of our project, social vulnerability refers to an inability to cope with stresses that act on a person or community's assets or livelihoods (Thailand Burma Border Consortium, 2004). An example of a social vulnerability is dependency, where a person may be dependent on outside agencies for house repairs because he or she lacks the necessary knowledge and/or skills. It has been noted by scholars that vulnerability is influenced by the cultural and social attributes of a community (Dynes, De Marchi, & Pelanda, 1987). Some examples of such attributes, which we call "social demographics," are socioeconomic status, ethnicity, education, and occupation (Cutter, Boruff, & Shirley, 2003).

Research Methods

Our objectives consisted of determining how the approaches used by the reconstruction organizations affected changes in villagers' social vulnerabilities and identifying important social demographics that have influenced these changes. To do this, we investigated the following research questions:

- What processes did the organizations use to plan and implement reconstruction in the Ranong and Phang Nga provinces?
- What changes to the villagers' social vulnerabilities occurred after the tsunami?
- How are the changes in social vulnerabilities related to the reconstruction approaches uses by the organizations?

Answering our first research question allowed us to understand the reconstruction processes used by organizations, while answering our second research question allowed us to understand the changes in villagers' social vulnerabilities that occurred after the tsunami. Our last research question helped us to relate the changes in social vulnerabilities to the reconstruction approaches used by organizations, therefore allowing us to make comparisons and establish causal relationships between the processes used by organizations and the resulting affects upon vulnerabilities.

In order to answer our three research questions, we performed in-depth research through case studies of six villages in the Ranong and Phang Nga provinces, and broader research about villages and organizations through the use of archival research and interviews with organizations. We identified the reconstruction approaches used in the villages by performing semi-structured interviews with representatives of three different organizations and also by performing interviews with villagers, where possible. We used semi-structured interviews with villagers (in case study villages) to understand the changes in their social vulnerabilities. To better relate the reconstruction approaches to the changes in villagers' vulnerabilities, we created a database in Microsoft Access that we used as a tool to organize the information we gathered.

Findings

We have divided our findings into three categories: reconstruction approaches used by organizations, changes in villagers' social vulnerabilities, and analysis of the relationships between reconstruction approaches and social vulnerabilities. The last category describes our central findings because this section details the causal relationships between the approaches used by organizations and the changes in social vulnerabilities.

Reconstruction Approaches Used by Organizations

We have found that the level of involvement of villagers in the design and/or physical reconstruction of the houses varied by organization. Some organizations, such as the Rotary Club of Patong Beach, allowed villagers to individually design and build their own houses, while others, such as the Thai government, did not include villagers in either the design or construction. We found that organizations relocated some villages

due to safety and/or land ownership issues because they were either located in the tsunami inundation zone and/or on land that did not belong to the villagers. We found that during the reconstruction effort, there was little coordination among the central and provincial governments. We found that there was also little coordination between government agencies and NGOs. We found that, in some cases, organizations may have used unsafe materials or construction techniques. We also found that in addition to rebuilding homes, some organizations, such as Save Andaman, have helped to restore villagers' livelihoods.

Changes to Villagers' Social Vulnerabilities

We found that some villagers are unable to perform repairs on their new houses because they have little knowledge of the materials and construction techniques used or do not have access to the proper materials. Therefore, villagers have an increased dependency on others. We found that some reconstructed houses have not met the specific needs and wants of the villagers. For example, many homes were built with an open kitchen, which creates problems during the rainy season. We found that when villagers were relocated from coastal areas, they experienced changes in vulnerabilities. These include changes in vulnerability from economic strains, occupational shifts, new land ownership, and modernization. We also found that some villagers do not trust the structural integrity of their houses because they feel certain structures are unstable or poorly constructed.

Analysis of the Relationship between Reconstruction Approaches and Changes to Villagers' Social Vulnerabilities

We found that when villagers were not involved in the reconstruction process, they tended to become more dependent on others for house modifications and repairs. When organizations did not involve villagers in the design and construction of the houses, villagers were more dependent on outside resources because they were either unfamiliar with the materials and construction techniques used or did not have access to the proper materials.

We found that when villagers were not involved in the reconstruction process, they felt that their houses did not suit their needs and wants. In these cases, villagers

were unable to communicate such needs and wants to organizations because they were not involved in the reconstruction process.

We found that when villagers were relocated due to land ownership or safety issues, they experienced changes in social vulnerabilities. Villagers experienced an increased vulnerability to economic stresses due to occupational shifts and new economic strains. Some villagers also experienced a decreased vulnerability to eviction due to new land ownership.

We identified occupation, income, and family structure as being important social demographics that influenced changes in social vulnerabilities brought about by the reconstruction effort. For example, we have found that when some villagers were relocated further from the sea, they were unable to fish as frequently as before the tsunami, which increased their vulnerability to economic stresses because they had a decrease in income. Also, some houses that were built did not meet villagers' needs for their family sizes and age distributions. Some houses were two stories, which caused problems for elderly family members, and some did not provide sufficient space for villagers' family sizes. The social vulnerabilities that were influenced by occupation, income, and family structure, were a result of the specific reconstruction approaches that were used.

Recommendations

Based on our findings and background research, we offer a series of recommendations for NGOs and government agencies to improve the outcome of future reconstruction efforts so houses meet residents' needs and do not increase vulnerabilities. We also offer a set of recommendations for future researchers to explore gaps in knowledge that we have identified.

Recommendations for Organizations:

NGOs and/or government agencies should seek to involve the affected community in the design and physical construction of their houses. Our findings show that when the community is not involved in the reconstruction process, the houses did not suit their needs and wants and villagers were unable to perform necessary repairs. Previous research has shown that involvement of the community will ensure the houses meet their

needs. For example, following an earthquake in Guatemala, residents designed and built their own houses and were pleased with the outcomes (Anderson & Woodrow, 1989). Studies of other tsunami affected villages have also shown that when residents were not involved in the reconstruction process they lacked knowledge of the materials and construction techniques (DeMasi et al., 2006). Therefore, we recommend that organizations involve the community in both the design and physical construction to ensure that houses meet the needs and wants of residents and to ensure that residents will have the knowledge to make necessary repairs.

If a community must be relocated, NGOs and/or government agencies should choose the location that minimizes negative impacts on residents' lives and livelihoods. We have found that when villagers were relocated, some experienced increased vulnerabilities to economic stresses and occupational shifts. Therefore, we recommend that during relocation, organizations consider all possible locations and choose the one that will be least likely to disrupt residents' lives and livelihoods.

When NGOs and/or government agencies make decisions regarding the relocation or design of houses, they should consider the social demographics of the community, specifically occupation, income, and family structure. We have found that occupation, income, and family structure are important social demographics that influenced changes in vulnerabilities. In order to design houses that fit the cultural and social needs of the residents, we recommend that organizations consider the social demographics of the community.

Coordination among government agencies should be improved. We found that there was a lack of coordination between the provincial and central governments, therefore causing miscommunications. Improved coordination among government agencies will help prevent miscommunications in the event of a future disaster. This will ensure that the government-built houses better suit the needs of the affected people.

Coordination between government agencies and NGOs should be improved. We have found that there was little coordination between NGOs that performed reconstruction and government agencies, which resulted in a lack of records of the reconstruction at the national level. We recommend that future relief efforts are better coordinated in order to ensure that they run smoothly.

Recommendations for Future Researchers:

Researchers should continue gathering information regarding the reconstruction effort in other villages to determine if our findings can be generalized. We recommend that additional villages and organizations be studied in other tsunami-affected areas in order to determine if our findings can be generalized throughout tsunami-affected Thailand. Also, we recommend that the database be continuously updated as additional information is gathered.

Researchers should explore the relationships between organizations' efforts to restore livelihoods and changes in villagers' social vulnerabilities. We hypothesize that organizations that have helped to restore villagers' livelihoods have, in turn, alleviated some social vulnerabilities brought about by the reconstruction effort. Since we were not able to fully explore this issue, future researchers should explore how the restoration of livelihoods has affected changes in vulnerabilities Researchers should also focus on understanding how the processes of livelihood restoration were coordinated with housing reconstruction.

Researchers should further investigate the processes of coordination among government agencies used during the reconstruction effort. Since we were not able to fully understand the process of coordination among government agencies, it is important that future researchers determine this process so recommendations can be made to government officials.

Researchers should assess the physical safety of the construction techniques and materials used in the houses to determine the dangers villagers face. Although we were not qualified to assess the structural integrity of the houses, we did notice that many houses appeared unsafe. We recommend that future researchers aim to assess the physical safety of the houses in order to understand the risks villagers face.

Summary

Based on our research we have found that, in some cases, the reconstruction approaches used resulted in houses that did not suit the needs and wants of the villagers and have increased their social vulnerabilities. The recommendations we have offered organizations are intended to improve future reconstruction efforts by ensuring that the houses meet the needs and wants of the residents and that they do not cause an increase in social vulnerabilities. Our recommendations for future researchers are intended to help broaden the scope of information about the reconstruction effort, as well as to explore gaps in information that we have identified. With this information, it is our hope that future reconstruction efforts will better meet disaster victims' long-term needs by providing them with houses that they can call their own.

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1 Introduction

Natural disasters cause devastating destruction. A disaster occurs when a risk or hazard exceeds a society's ability to cope with its effects (Anderson & Woodrow, 1989). An estimated 80,000 people are killed annually by natural disasters (Walter, 2002) – approximately 97% of these deaths occur in third world countries (Schilderman, 2004). In the 1990s alone, natural disasters caused economic losses amounting to $63 billion USD. It is predicted that this number could soon increase to $300 billion USD due to global warming related disasters (Walter, 2002). The degree of damage caused by a disaster is related to the vulnerabilities of the affected area, where vulnerabilities refer to the susceptibility of people both physically and socially (Cannon, Rowell, & Twigg, 2003).

After a natural disaster strikes an area, relief and recovery efforts are undertaken to restore the community to a functional state, but often "disaster relief and recovery assistance fails to take into account the need to support livelihoods and future resistance to hazards" (Adger, 2001, pg. 5). In many cases, organizations are more focused on meeting the immediate needs of the victims, rather than lessening future vulnerabilities (Anderson & Woodrow, 1989). These vulnerabilities can be physical, such as increased exposure to wind, rain, sun, future disasters, etc., or social, such as societal dependencies or deficiencies that damage social structure (Cannon et al., 2003).

On December 26, 2004 a devastating tsunami struck the southwest coast of Thailand, killing approximately 8,300 people and damaging 407 villages, with 47 completely or mostly destroyed. In the major relief effort following the tsunami, many organizations (both governmental and non-governmental) began to reconstruct the houses that were destroyed throughout the affected area. These reconstruction organizations were able to provide housing to many displaced families in a relatively short period of time.

However, in a recent study, DeMasi, LeBlanc, O'Dowd, and Peyser (2006) discovered that the reconstruction performed by the Thai government in the villages of Ban Tub Nua and Ban Hat Sai Khao of the Ranong Province increased both the physical and social vulnerabilities of its residents. The new houses increased their vulnerabilities

to rain, wind, sun, and also future tsunamis. Additionally, they found that villagers were unable to maintain and repair their houses when needed because they are unfamiliar with the new construction techniques and the materials used by reconstruction organizations (DeMasi et al., 2006).

Although DeMasi et al. (2006) have identified many concerns in the villages of Ban Tub Nua and Ban Hat Sai Khao, their findings only represent the cases of two villages. It was left unclear whether such negative effects of the reconstruction effort are present in other villages that were reconstructed in Thailand. This leads to the question of how the reconstruction approaches used by organizations influenced villagers' vulnerabilities.

In this project, we explored the relationships between the reconstruction approaches used and changes in villagers' vulnerabilities by focusing on the reconstruction of residential houses in the Ranong and Phang Nga provinces. We gathered information regarding the processes used by organizations to plan and implement the reconstruction in order to determine how these processes may have caused changes in vulnerabilities. We hypothesized that the social demographics of the communities (the social and cultural characteristics of the population) were not considered during the reconstruction and therefore, the villagers' social vulnerabilities were increased. Through a case study of six villages in the Ranong and Phang Nga provinces, we identified some important social demographics that influenced specific changes in social vulnerabilities brought about by reconstruction approaches. With this information relief organizations can better understand which social demographics and reconstruction approaches they must take into consideration to minimize changes in vulnerabilities during future reconstruction efforts.

2 Background

The reconstruction effort in Thailand following the tsunami successfully provided housing to the victims, but there is evidence that in some cases it increased their vulnerabilities (DeMasi et al., 2006). This chapter will provide background information about the effect of the tsunami and the reconstruction following the tsunami. An overview of the tsunami and its effects on the Thai people will be described in order to depict the level of devastation. The chapter will also give some information about post-disaster reconstruction practices in general. Understanding recommended reconstruction practices allowed us to better assess the reconstruction that was performed in Thailand following the tsunami by giving us a means of comparison. The chapter will then discuss issues relating to the reconstruction, including which organizations contributed. We will also provide a detailed explanation of the concepts of vulnerability and social demographics. To better facilitate our focus on housing reconstruction, only the Ranong and Phang Nga provinces were studied because they are primarily residential regions rather than tourist regions, such as the province of Phuket.

2.1 Tsunami Damage Assessment

As a result of the tsunami, many lives were lost, entire villages were destroyed, houses and buildings were damaged, natural resources were lost, and livelihoods were destroyed. This section will describe the damage the tsunami caused to the people, infrastructures, and environment of Thailand.

2.1.1 The People

The number of deaths and injuries in Thailand was the most devastating aspect of the tsunami. As of one year after the tsunami, the death toll was into the thousands, totaling 8,212 – 8,327 persons, with 5,395 people confirmed dead and 2,817 people presumed dead (UNDP, 2005, Rigg, Law, Tan-Mullins, & Grundy-Warr, 2005, Department of Disaster Prevention and Mitigation [DDPM], 2006). In addition to the number of deaths, there were a total of 8,457 people injured during the tsunami, many of whom were not able to get immediate care in adequate medical facilities. These numbers are not 100% accurate because of the large number of unidentified bodies and the

probability that people died who were not known or looked for by loved ones. The death toll declared by the government, however, does give a fairly accurate and gruesome idea of how much damage the tsunami has done (UNDP, 2005).

In addition to the death toll, the lives of those who did survive the tsunami have been adversely affected. Those who survived may have witnessed the death of loved ones, been rendered homeless, lost livelihoods, and lost independence by having to rely on others for a means of survival (UNDP, 2005). According to the UNDP (2005), the number of people who lost a family member or home in Thailand reached 100,000. Further intensifying the psychological effects of the villagers' losses, the death tolls also included religious and local leaders, which directly affected the lives of many villagers. With their leaders dead, these villages were unable to function as a community following the disaster because there was no one to provide leadership. Children that survived the tsunami have also been greatly affected. In Thailand, 1,449 children lost either one or both of their parents, making them orphans. Many schools were destroyed or damaged to the extent that classes had to be halted for an extended period, causing the education of 50,000 children to be disrupted (UNDP, 2005). These statistics show just how far reaching and devastating the tsunami was to the people of Thailand.

2.1.2 Village and Land Damage

Most of the southwest coast of Thailand was heavily damaged by the tsunami, including 6 provinces, 25 districts, 95 tambons (local governments, similar to a county), and 407 villages (UNDP, 2005, DDPM, 2006). Of those villages that were damaged 47 were either completely or mostly destroyed (UNDP, 2005). The villages that were completely destroyed were the ones that had the most loss of life and the biggest disruptions to the livelihoods of the residents. The provinces affected were: Krabi, Phang Nga, Phuket, Ranong, Satun, and Trang (Figure 1). Phang Nga was the most devastated area, accounting for over two-thirds of the total deaths, 57% of the destroyed houses, and half the estimated value of total housing damage (UNDP, 2005).

Figure 1: Map of Affected Areas in Southern Thailand (areas affected are shown in yellow, unaffected areas are shown in green)

(Pararas-Carayannis, 2005)

Official reports estimate that 3,302 homes were destroyed with an additional 1,504 houses damaged (UNDP, 2005, DDPM, 2006). The largest number of destroyed houses was in the province of Phang Nga, with 1,904 destroyed and 604 damaged, Phuket with 724 destroyed and 291 damaged, Krabi with 396 destroyed and 262 damaged, and Ranong with 224 destroyed and 111 damaged. Satun and Trang, the two southern most provinces, saw minimal damage in comparison to that of the other four, as shown in Table 1 (UNDP, 2005, DDPM, 2006).

Province	Houses Destroyed	Houses Damanged
Phang Nga	1,904	604
Phuket	724	291
Krabi	396	262
Ranong	224	111

Table 1: Housing Damage By Province

The DDPM (2006) reports that a total of 3,558 people put in requests for the construction of permanent houses. Approximately $36 million USD was given by private organizations to assist in the reconstruction of permanent houses in Phang Nga, Krabi, Ranong, and Phuket, with $31 million USD in Phang Nga, $2 million USD in Krabi, $2 million USD in Phuket, and less than $1 million USD in Ranong. The government also

provided approximately $2 million USD to reconstruct 3,367 houses in all affected provinces (DDPM, 2006). A summary of the damage caused by the tsunami can be seen in Table 2 below.

Confirmed Deaths	5,395 people
Uncomfirmed Deaths	2,817 people
Number of Destroyed Houses	1,504 houses
Amount of Money From Private Sector for Reconstruction	$36 million USD
Amount of Money From Government for Reconstruction	$2 million USD

Table 2: Summary of Tsunami Damage

In addition to the number of people killed and injured and buildings destroyed, the land and environment were also heavily damaged. The impact of the wave caused hazardous materials and debris from the destruction of houses, vehicles, and other buildings to scatter across the affected areas. There was also quite a bit of damage due to salt water intrusion on the mainland. Fresh water supplies were contaminated with salt, preventing villagers and residents from drinking their usual water supplies. Ground water has also been contaminated from the salt water, sewage, and waste seeping into it (UNDP, 2005). Additionally, some of the land that was swept over by the tsunami is now contaminated with much higher levels of salt, and can no longer be used for any significant agricultural purposes (UNDP, 2005).

2.2 Post Tsunami Reconstruction Effort in Thailand

Due to the massive amount of damage caused by the tsunami, many NGOs and governmental organizations began relief efforts in an attempt to restore the affected villages. Reconstruction following a disaster can refer to the construction of houses, resorts, hotels, or business offices, depending on the area affected. In the context of this project, reconstruction will refer to the reconstruction of houses.

2.2.1 Disaster Recovery – Phases and Rates of Recovery

In the case of any disaster, the relief effort can begin after the damage from a disaster is assessed. Major relief efforts can be broken down into three stages:

emergency, restoration, and post-restoration, each with a specific role in the effort (). With these phases, necessities are provided first, followed by a more complex system to restore livelihoods.

The emergency phase focuses on providing necessities – mainly housing, food and clothing – to those affected. In this phase, relief organizations will provide things that are critical to survival, such as temporary shelters, medical treatment, food, and clothing (Kent, 1987, Hass, Kates, & Bowden, 1977). In Thailand this phase consisted of tasks such as controlling the spread of disease, collecting and storing bodies, setting up temporary housing, and setting up centers for victim assistance (DDPM, 2006).

The second phase, the restoration phase, focuses on restoring structures that have been damaged or destroyed. This phase may consist of tasks varying from providing seeds and/or farming equipment to performing a large scale reconstruction of residences (Kent, 1987, Hass, Kates, & Bowden, 1977). Following the emergency phase, relief organizations in Thailand began replacing boats for fishermen, providing farming equipment, and reconstructing the houses of villagers (DDPM, 2006).

Following the restoration phase is the post-restoration phase, which may also be called the replacement reconstruction period. In theory, this last phase is meant to assess and minimize the vulnerabilities brought about by the emergency and restoration phases, which may include improvements to reconstructed houses, establishing a disaster escape plan, and pre-disaster planning (Kent, 1987, Hass, Kates, & Bowden, 1977). The work of this project focuses on the post-restoration phase by evaluating the outcomes of the reconstruction.

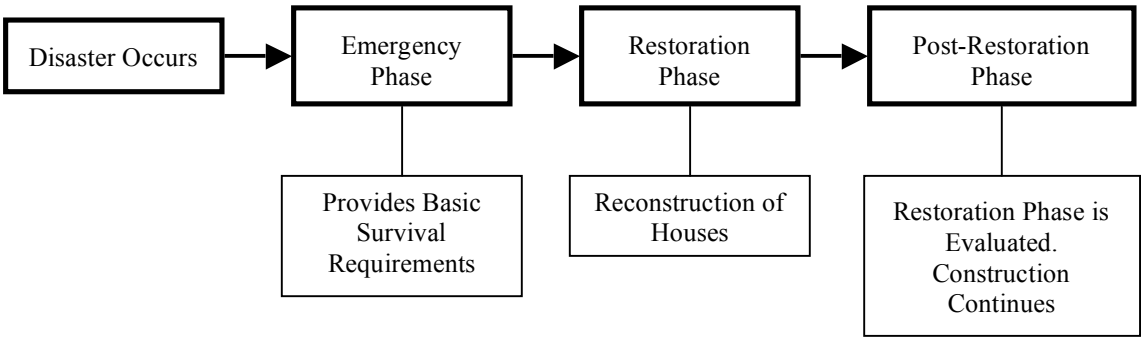

Figure 2: Phases of Disaster Relief

2.2.2 Overview of Tsunami Response in Thailand

Following the tsunami, the restoration phase focused on reconstructing damaged and destroyed houses. Many countries around the world, such as the United States, offered relief to the tsunami-affected countries, including Thailand (Thamnoon Srivontna, personal communication, January 24, 2007). Thailand's former Prime Minister, Thaksin Shinawatra, refused international aid, saying that other affected countries were in need of more help. According to Thamnoon Srivontna (personal communication, January 24, 2007), many Thai citizens, especially those directly affected by the tsunami, were opposed to this decision because they felt that they were, in fact, much in need of help. However, rather than accepting international aid, the Thai government performed a large portion of the reconstruction, with the King's Foundation and Princess Sirindhorn's Foundation donating the money required for the construction of the houses, while other governmental agencies, such as the Royal Thai Air Force and Military, performed the physical construction (Aacaan Absornsuda Siripong, personal communication, February 13, 2007). The Ministry of Interior informed us that the Bureau of Architecture created the designs for the government-built houses (personal communication, January 8, 2007).

2.2.3 Organizations Involved

Despite the Prime Minister's refusal to accept aid, many national and international NGOs reconstructed villages in the tsunami-affected provinces by establishing local contacts within the provincial government (Thamnoon Srivontna, personal communication, January 24, 2007). Thus, there were no records kept in the central government of which organizations performed reconstruction and where they worked, although we were informed that select records may be found at the provincial level (Thamnoon Srivontna, personal communication, January 24, 2007).

It is difficult to find all of the organizations that performed reconstruction, as well as which villages they reconstructed because of the lack of records that were kept. We have compiled a limited list of some NGOs that performed reconstruction in Thailand, the villages they reconstructed, the dates of work, and the number of houses built, which we obtained from D-TRAC – a private organization based in Thailand that provides

information about the tsunami and the reconstruction effort (Disaster Tracking Recovery Assistance Center [D-TRAC], 2006). We have also compiled information regarding the villages that were reconstructed by the Thai government from a report by the Federation of Southern Fisherfolk, Save Andaman Network, and Sustainable Development Foundation (2006). The list that we have compiled can be found in a table in Appendix E and can also be viewed in a more organized manner in the database we have created, which we will discuss in more detail in our methods section.

The list we have created is incomplete because we found no central documents of all the organizations that performed reconstruction in Thailand, as discussed in the previous section. Also, some items are referred to as "unknown," meaning that we were unable to gather this information from the resources available to us. We believe that there may be additional resources and records found in the provincial offices that we were unable to obtain.

As can be seen in Appendix E, many of the NGOs that performed reconstruction are organizations from Thailand, such as Save Andaman, the Rotary Club of Patong Beach, and the Phuket Tsunami Recovery Fund. Additionally, some international NGOs performed reconstruction, such as Habitat for Humanity, the Swiss Agency for Development and Cooperation, and World Vision. Some organizations, such as Save Andaman, Habitat for Humanity, Community Organizations Development Institute, and the Thai government reconstructed villages in the four provinces that incurred the most damage (Phang Nga, Ranong, Phuket, and Krabi), while other organizations, such as Loung Marc, the Phuket Tsunami Recovery Fund, and the Social Pastoral Center reconstructed villages in only one province.

2.2.4 Reconstruction in Ban Tub Nua and Ban Hat Sai Khao

Although it has been difficult to gather information regarding the details of the reconstruction effort, there has been a study performed by DeMasi et al. (2006) to understand the effects of the reconstruction effort by the Thai government in the villages of Ban Tub Nua and Ban Hat Sai Khao of Ranong province. They have found that in some cases, the reconstructed houses increased the vulnerabilities of the villagers, while in other cases the reconstruction promoted villagers' livelihoods and therefore decreased

vulnerabilities. (Vulnerabilities describe a society's social or physical susceptibility to certain risks or hazards. A complete discussion of vulnerability is provided in Section 2.4.) For example, Habitat for Humanity ensured that villagers were knowledgeable about the materials and construction techniques used so that they could repair and maintain their houses, thereby decreasing their social vulnerabilities (DeMasi et al., 2006). The findings from the two villages studied by DeMasi et al. (2006) will be explored and discussed in this section, but it is important to keep in mind that these findings only reflect the study of two villages.

The primary finding of DeMasi et al. (2006) was that the reconstruction effort following the tsunami has left many village residents more socially and physically vulnerable than before the disaster. The houses increased the villagers' vulnerabilities to rain, wind, and sun. The materials used in the reconstruction do not absorb rain, as the villagers' old houses did, which has subsequently created flooding in villagers' houses during storms. These inadequacies caused the villagers to be more susceptible to everyday changes in the weather. Additionally, the village layout in Ban Tub Nua and Ban Hat Sai Khao is now in rows, which raised concerns that increased wind speeds during storms would cause more destruction to the houses than their pre-tsunami houses (DeMasi et al., 2006).

Another important finding was that the residents of these two villages were not sufficiently included in the design and construction of the houses, and therefore do not fully understand how to care for the new structures. The houses were built with materials that are unfamiliar to villagers, so they must rely on outside help to repair and maintain their homes. Also, by using rapid visual assessment techniques, DeMasi et al. (2006) found that many villagers have made unsafe additions to their homes. For example, many villagers had constructed only partially completed additions, which increases their vulnerabilities because these uncompleted walls do not bear loads properly. Many villagers believed their additions were unsafe and could possibly be harmful because they had a lack of knowledge about construction techniques that would reduce vulnerabilities (DeMasi et al., 2006).

In summary, villagers are now less independent and must seek outside help to deal with the problems caused by the reconstruction. Unfortunately, the villagers do not

seek outside help and often will try to fix the problems themselves, as reported by DeMasi et al (2006). The local NGOs were supposed to provide village representatives that the villagers could contact for information or help with any problems associated with their new housing. Unfortunately, none of the villagers interviewed knew the contact information for their village representative (DeMasi et al., 2006).

It is unknown whether these problems have occurred elsewhere in Thailand because there is a lack of information regarding the post-tsunami reconstruction in other villages. It is also unclear how these problems may be related to the reconstruction practices used by the organizations. However, the same problems have occurred during past reconstruction efforts after other natural disasters, suggesting that findings in these two villages may not be isolated incidents. For example, the reconstructed houses that were built after an earthquake in India in 1993 were made of modernized materials that villagers were unfamiliar with. In response to this, villagers rebuilt their homes using local materials and traditional techniques, increasing their vulnerabilities to a future earthquake (Boen & Jigyasu, 2005, Salazar, 2001). These experiences suggest that often "disaster relief and recovery assistance fails to take into account the need to support livelihoods and future resistance to hazards by reducing vulnerability" (Adger, 2001, pg. 5). In the following section we will turn to some reconstruction approaches recommended by scholars to reduce future vulnerabilities.

2.3 Practices to Consider in Reconstruction

As described previously, the post-restoration phase is when major reconstruction of housing and infrastructure takes place. In this phase, there are many practices and procedures that scholars recommend for relief organizations in order to reduce the affected community's vulnerabilities. It is important to keep in mind that the practices presented in this section are based upon lessons learned from previous disasters and may not apply to all reconstruction situations.

First, past experience provides evidence that all participating organizations should work together to organize, coordinate, and plan the reconstruction effort, considering the possible short term and long term effects of the reconstruction on the community (Walter, 2005, Organization for Economic Cooperation and Development [OECD], 1996).

Scholars suggest that the work be divided such that each organization focuses on one aspect of the community's recovery and that their focus reflects each organization's specialized skills, such as planning, construction, or interviews with the local people (Walter, 2005). It is recommended that the information gathered be shared among all of the participating NGOs and governmental organizations (Walter, 2005). Coordination between the organizations is best achieved by having a single coordinator, who can be a single person in the case of a small disaster, or a large group for a large disaster, to oversee all reconstruction activity, ensuring that everything is properly organized (Walter, 2005).

Scholars advise that organizations consider the opinions of the victims of a disaster and involve them in the reconstruction effort (Walter, 2005, ALNAP, 2005, OECD, 1996). Past experience has shown that involving the community will help ensure that the housing provided adequately meets residents' needs (ALNAP, 2005). It seems obvious that organizations should involve the victims, but this practice is often overlooked because organizations rush to provide the community with housing to meet immediate survival needs (Anderson & Woodrow, 1989, Cannon, Rowell, & Twigg, 2003). For example, following an earthquake in Gediz, Turkey in March, 1970, the local community was not involved in the reconstruction effort. Village residents were unhappy with the design of the new houses, village layout, and placement. In this case, many villagers returned to the site of their old homes to rebuild their houses using the style of traditional houses (Mitchell, 1976).

On the other hand, when villagers are involved in the reconstruction process they are generally pleased with the outcomes. Following an earthquake in Joyabaj, Guatemala in 1976, ALIANZA (Alianza para el Desarrolo Integral de la Juventud), the organization heading the reconstruction effort established a program to train residents in the principles of earthquake-resistant housing. Villagers were then able to reconstruct their own houses with materials provided by ALIANZA, by following the design of a demonstration house. ALIANZA, then, set up a system to inspect the houses to be sure that they met the appropriate requirements (Anderson & Woodrow, 1989).

Input from the affected people can be obtained through direct interviews or consultations, assessments, or information gathered from local leaders (Walter, 2005,

OECD, 1996). It is suggested that this sort of input be gathered regularly throughout the reconstruction process to confirm that the people are satisfied or to learn why they are dissatisfied with the results (ALNAP, 2005, Walter, 2005). Constant communication may help gain the local community's trust of the organizations (ALNAP, 2005).

Past experience has demonstrated that the best way for relief organizations to gather information about the local area and its people is to work with local groups and organizations (OECD, 1996). Local groups and agencies can provide the best insight into the needs and wants of the local people and can also constantly assess and maintain contact with the community (OECD, 1996). By involving the local community in the reconstruction, the idea is that they will feel a sense of ownership, empowerment, and will be pleased with the outcomes of the new houses (Walter, 2005).

Scholars recommend that organizations use local resources and local labor when rebuilding houses, to ensure that the local people will be able to maintain and repair their houses in the future, preventing their dependency on outside agencies (ALNAP, 2005). Also, using local labor may boost the economy in the affected area and could speed the rate of recovery (ALNAP, 2005). Following an earthquake in Maharashtra, India on September 30, 1993, the organizations leading the reconstruction created modernized houses using industrialized materials and did not consider the use of local materials because they felt this would prevent damage from future earthquakes. Many villagers rebuilt their homes using traditional materials and building techniques, making them as vulnerable as they were before the earthquake (Boen & Jigyasu, 2005, Salazar, 2001).

Finally, it is strongly suggested that organizations reduce the social and physical vulnerabilities of the community (ALNAP, 2005). If the reconstruction does not reduce vulnerabilities inherent in the pre-disaster state, then it is not providing the community with a solution. Reconstruction following a disaster should not be performed so quickly that the community is put in the same situation as (or a situation worse than) before the disaster (ALNAP, 2005, Walter, 2005). Following the 2004 tsunami in India, reconstruction was begun so soon that "many groups undertook rapid assessments that overlooked some of the complexities of the communities they were assessing" (Walter, 2005). Obviously, the purpose of reconstruction should be to help the affected

community, both in the long term and the short term. A summary of the reconstruction approaches described in this section can be found in Table 3.

Reconstruction Approaches Recommended by Scholars
Coordination of relief effort between organizations
Communication with villagers at all stages
Involvement of disaster victims (during planning, construction, and after construction)
Use of local resource and labor
Consideration of vulnerability reduction

Table 3: Recommended Reconstruction Practices

2.4 Vulnerability

As discussed above, past experience has shown that the use of the described reconstruction approaches will help to reduce a disaster affected area's vulnerabilities. DeMasi et al. (2006) have speculated that the reconstruction following the tsunami did not adequately take into consideration the physical and social vulnerabilities of the villagers, as described in Section 2.2.4. To better understand the effects of the reconstruction on the villages, this section will explain the concept of vulnerability, focusing particularly on its *attributes*, *categories*, and *scales*.

Vulnerability as understood by Cannon, et al. (2003), is "a way of conceptualizing what may happen to an identifiable population under conditions of particular risks and hazards" (p. 4). The analysis of vulnerability is used as a tool to predict the physical and social effects of a future hazard or the impacts of a past event (Adger, 2001). Vulnerability can be broken up into two main categories, physical and social (Cannon et al., 2003, Adger, 2001). Vulnerability may also be related to different scales, including individual and collective (Cannon et al., 2003, Adger, 2001). All vulnerabilities, regardless of category or scale, can be described by three attributes – exposure, sensitivity, and resilience (Turner, et al., 2003, Kasperson, J.X., Kasperson, R.E., Turner, Hsieh, & Schiller, 2003).

The three attributes – exposure, sensitivity, and resilience – determine the degree of vulnerability. *Exposure* focuses on the studied society's amount of contact with possible hazards that could lead to disaster. For example, a group of people may be located along the beach and therefore may be exposed to tsunami. The degree of exposure in the area depends on the frequency, magnitude, and duration of the hazard. *Sensitivity* is the susceptibility of a society to a potential hazard – a hazard will cause more damage or stress to a society with a higher sensitivity. The level of sensitivity may be decreased by taking certain measures to reduce vulnerabilities, such as resilient construction for a tsunami, or improving education about tsunami evacuation procedures. *Resilience* describes a group's or individual's ability to recover from a disaster. A resilient community will be able to cope with the effects of the disaster, which can be done in a variety of ways, such as implementing new programs or policies to restore the community to a normal state (Turner, et al., 2003, Kasperson, J.X., et al. 2003).

With these attributes in mind, vulnerabilities may be categorized as either physical or social. In the physical sense, it is "the likelihood of buildings to collapse or infrastructures to be damaged" (Cannon et al., 2003, p. 5). Social vulnerability is "a limited capacity to cope and recover from stresses and shocks on assets, activities and capabilities related to survival and development (Thailand Burma Border Consortium, 2004, p. 10), where stress is described as "a disruption to groups or individuals' livelihoods" (Adger, 2001, p. 5).

Both physical and social vulnerabilities can be further characterized by two broad scales – collective or individual, as shown in Figure 3. A collective vulnerability describes a vulnerability that a group of people may face, while an individual vulnerability describes a vulnerability that a single person may face. Collective vulnerability is assessed by the presence of social institutions within the community that establish preparedness, precautions, and social protection, such as disaster mitigation or shelters. Individual vulnerability is determined by such things as individual social status, income, diversity of income sources, protection afforded by the individual's home, and physical health. Although these two types of vulnerability are distinctly different, they are interrelated in that collective vulnerability affects individual vulnerability and vice versa (Cannon et al., 2003, Adger, 2001). For example, if a community is vulnerable to a

natural disaster because they lack disaster mitigation and preparedness plans, it is very likely that individuals' homes are physically vulnerable to the disaster because they may lack knowledge about disaster resistant construction.

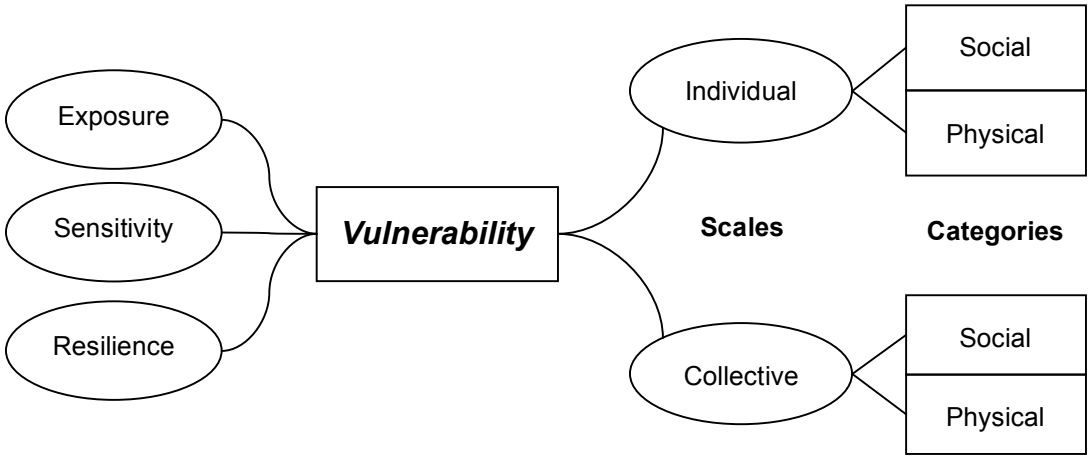

Figure 3: Relationships between Categories and Dimensions of Vulnerability

In the villages of Ban Tub Nua and Ban Hat Sai Khao, the relationships described here about the attributes, categories, and scales of vulnerability apply. Considering how much damage the Ranong province incurred from the tsunami, it is obvious that there was much physical vulnerability present. The reconstruction effort has brought social vulnerabilities, such as an increased dependency on outside agencies to maintain their new houses (DeMasi et al., 2006), as discussed in Section 2.2.4. There is a high level of exposure to tsunamis in these two villages and therefore a high vulnerability because they are less than one mile from the coast (DeMasi et al., 2006). The level of sensitivity in these villages was also high because of the poor quality of construction of the pre-tsunami houses and lack of preparedness of the villagers (DeMasi et al., 2006), as discussed in Section 2.2.4. Also, the communities affected were not very resilient because they were unable to cope with the effects of the tsunami (DeMasi, et al., 2006).

2.5 Social Demographics

As described in the previous section, the vulnerability of a community is determined by its exposure, sensitivity, and resilience to a hazard. These factors of

vulnerability are affected by social demographics – the social or cultural attributes that define the region or people (Dynes, De Marchi, & Pelanda, 1987).

"The degree of vulnerability of a social system to a natural disaster is determined by the interaction of the physical properties of a disaster agent and the cultural, social, and psychological factors characteristic of the population occupying the specific location" (Dynes et al., 1987, p. 31).

No universal set of factors can define the social demographics that affect vulnerability, but there is a general consensus in the social science community about what demographic factors influence vulnerability. Cutter, Boruff, and Shirley (2003) have compiled a list, from a variety of sources, of social demographics that may influence social vulnerability. These social demographics can be classified into the following categories: social, physical, economic, and cultural, where social describes an attribute of the society or interactions between people, physical describes the infrastructure of the area, economic describes the degree of wealth or economy of the region, and cultural describes the beliefs and customs of the people, as seen in Figure 4. These classifications of the demographics can be seen in Figure 4. All of the social demographics listed below will play a role in affecting a community's social and/or physical vulnerabilities.

Social	Physical	Economic	Cultural
Family Structure Education Gender Special Needs Population	Population Growth and Density Infrastructure and Lifelines	Socioeconomic Status Employment Loss Occupation Home Ownership Commercial & Industrial Development Medical Services	Race Ethnicity Religion

Figure 4: Social Demographics and Their Classifications

2.6 Summary

Vulnerabilities are factors that increase a community's susceptibility to hazards. The devastation caused by the 2004 tsunami resulted in part from the affected villages' vulnerabilities. Following the tsunami, a reconstruction effort was begun to restore the area to its original state. DeMasi et al. (2006) have studied the reconstruction effort in

the villages of Ban Tub Nua and Ban Hat Sai Khao in the Ranong province. They have found that in these villages, which were rebuilt by the Thai government, some of the villagers' vulnerabilities were increased after the tsunami and reconstruction effort. For instance, the reconstructed houses caused villagers to depend on outside help to maintain their houses. The houses made villagers more susceptible to everyday changes in weather, such as wind, rain, and sun. Also, villagers had begun adding unsafe additions to their houses, which further increased their vulnerabilities.

The vulnerabilities seen in Ban Tub Nua and Ban Hat Sai Khao may have been prevented if recommended reconstruction practices had been used. If organizations had used local labor and resources, villagers may have obtained the abilities to maintain their new houses. Villagers may have learned how to build safer additions to the houses if they had been taught about proper construction techniques. Many of these problems are a result of a lack of communication with the villagers throughout the reconstruction process. Also, villagers would have been less susceptible to sun, wind, rain, if organizations had more thoroughly considered reducing vulnerabilities in the villages.

In order to identify how the changes in vulnerabilities came about, these changes must be thoroughly studied, along with the reconstruction approaches used. Relating these changes in vulnerabilities to the reconstruction approaches used in each village, will provide a better understanding of exactly how the reconstruction approaches affected the changes in vulnerabilities of the villagers. Also, it is important to identify the social demographics of the villages that may have mediated these changes. The following chapter will explain the methodology we used to gather information about these issues.

3 Methods

In order to accomplish our goals of relating the reconstruction approaches used by organizations to the changes in social vulnerabilities villagers are experiencing and identifying the important social demographics that mediated changes in social vulnerabilities, we investigated the following research questions:

- What processes did the organizations use to plan and implement reconstruction in the Ranong and Phang Nga provinces?
- What changes to the villagers' social vulnerabilities occurred after the tsunami?
- How are the changes in social vulnerabilities related to the reconstruction approaches uses by the organizations?

In order to answer our research questions, we performed case studies of six villages in the Phang Nga and Ranong provinces to gain an in-depth view of the reconstruction effort. Also, we performed additional interviews and archival research to supplement our findings from the case studies, thereby gaining a broader view of the reconstruction. We used semi-structured interviews with the directors of the relief organizations to determine the processes and approaches used in the villages to plan and implement the reconstruction. We used semi-structured interviews with villagers and surveys to understand the changes in social vulnerabilities that villagers now face. In order to systematically organize this information for our analysis, we compiled our data into a database, constructed using Microsoft Access 2003. Once this information was gathered and organized, we were able to relate the reconstruction approaches used to the changes in social vulnerabilities and to infer the social demographics that may have mediated changes in social vulnerabilities brought about by the reconstruction effort. From these findings, we were able to recommend reconstruction processes that organizations should use as well as the types of social demographics that may be important for organizations to consider. The process by which we gathered and used our data can be seen in Figure 5.

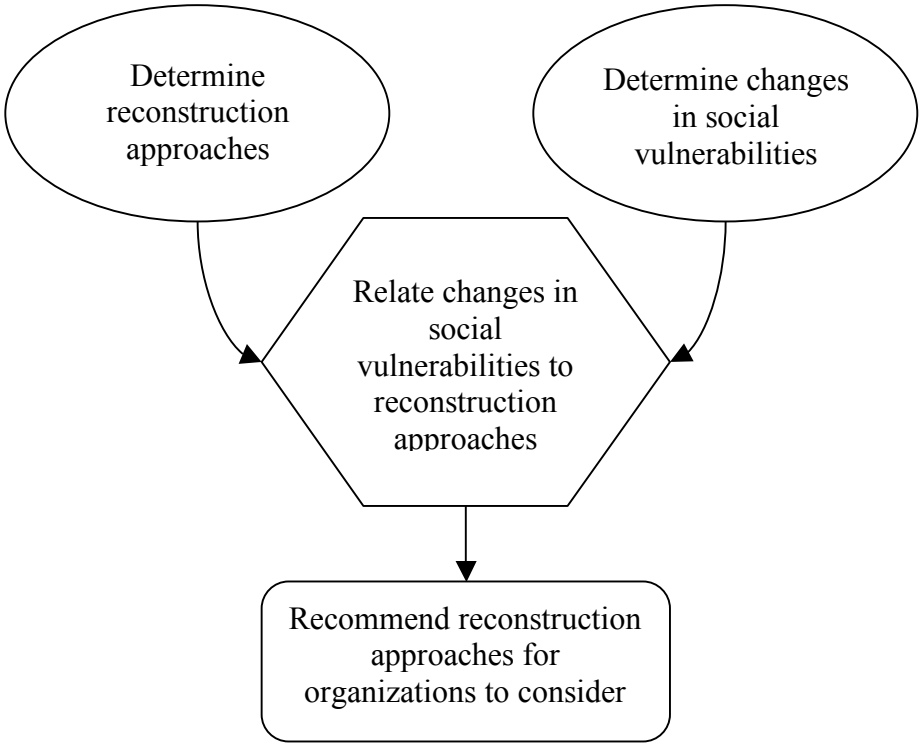

Figure 5: Summary of Method Objectives

In the following sections we will discuss the research methods that we used to answer each research question.

3.1 Case Studies

We were able to answer our research questions by performing field work in Ban Pak Triam, Ban Tarnkirin, Ban Chai Pattana, Chumchon Tap-parat, Ban Tub Nua, and Ban Talay Nok, which are all located in the Ranong and Phang Nga provinces. We were able to gain access to these villages through our contact with Chris Dunbar of USAID, Bodhi Garrett of North Andaman Tsunami Relief (NATR), and our sponsor, Aacaan Absornsuda. In addition to the case studies of these selected villages, we have performed additional archival research and interviews to learn about the reconstruction in other tsunami-affected villages. A brief description of each village will be presented in this section, followed by a summary of this information in Table 4.

3.1.1 Ban Pak Triam

The village of Pak Triam is located in the Khura sub-district of the Khuraburi district in the Phang Nga province. It is a predominantly Muslim and fishing village, which was reconstructed by the Rotary Club of Patong Beach. The village contains 23 reconstructed houses. Prior to the tsunami, the village was located on Nang Dam Island and was relocated to the mainland because the village was completely destroyed and there was fear that this might happen again in the event of a future tsunami. In Ban Pak Triam, we interviewed the head of the village and briefly spoke to three additional villagers.

3.1.2 Ban Tarnkirin

Ban Tarnkirin is a Buddhist, fishing village, located in the Khuraburi district of the Phang Nga province. The village consists of 20 families from village #4 on Patong Island that were relocated by the government because there was a general consensus that the island was not safe in the case of a future tsunami. (Villagers and heads of the villages with whom we spoke referred to the villages on Patong Island by number, rather than by village name.) Village #4 contained 120 villagers, 49 of whom died during the tsunami. The remaining members of village #4 were relocated to another village, Ban Chai Pattana in the same district and province as Ban Tarnkirin. Ban Tarnkirin was reconstructed by the Secours Populaire Française (SPF). We were able to interview the head of the village in Ban Tarnkirin.

3.1.3 Ban Chai Pattana

Ban Chai Pattana is a fishing village with both Buddhists and Moken people containing 130 houses. It contains villagers relocated from villages #2 and #4 on Patong Island. It is located in the Khuraburi district of the Phang Nga district. The money for the reconstructed houses was donated by Princess Sirindhorn's Foundation as well as the King's Foundation, while physical construction was done by the Royal Thai Air Force, along with volunteers from the Ratburri province. In Ban Chai Pattana, we interviewed the head of the village, along with two other villagers.

3.1.4 Chum Chon Tap-Parat

Chum Chon Tap-Parat is a Buddhist and Moken village, located in the Khuraburi district of the Phang Nga province. It consists of 42 houses relocated from village #2 on Patong Island. Only six villagers from the original village were killed by the tsunami. The village was reconstructed by the Catholic Mission of Surat Thani, while the funding for the houses was donated by Caritas International. We interviewed two villagers from Chum Chon Tap-Parat

3.1.5 Ban Tub Nua

Ban Tub Nua is located on Prapat Beach in the Nai Wong Nua sub-district of the La Un district in the Ranong province. It is a fishing village with 80% Muslims and 20% Buddhists that was physically reconstructed by the Royal Thai Air Force, with the funding obtained from the King's Foundation and Princess Sirindhorn's Foundation. This village contains 69 houses and was not relocated following the tsunami. The tsunami killed 42 villagers in Ban Tub Nua. In this village, we interviewed one villager.

3.1.6 Ban Talay Nok

Ban Talay Nok is a Muslim, fishing village located in the Suk Samran district in the Ranong province. Twenty houses that were originally along the beach were moved uphill to the center of the village. The houses had to be relocated because the villagers' pre-tsunami houses were located on national park land, which was owned by the Thai government. Ban Talay Nok was reconstructed by the Thai government. In Ban Talay Nok, we interviewed one family, the head of the village, and handed out surveys to 15 villagers.

Village	Reconstruction Organization	Province	Major Religion	Major Occupation	Relocated From?	Number of Houses	# of Villagers Interviewed
Ban Pak Triam	Rotary Club of Patong Beach	Phang Nga	Muslim	Fishing	Nang Dam Island	23	4
Ban Tarnkirin	Secours Populaire Française	Phang Nga	Buddhist	Fishing	Patong Island (Village #4)	Unknown	1
Ban Chai Pattana	Royal Thai Air Force, King's Foundation, & Princess Foundation	Phang Nga	Buddhist	Fishing	Patong Island (Village #4 & #2)	130	3
Chum Chon Tap-Parat	Surat Thani	Phang Nga	Buddhist	Fishing	Patong Island (Village #2)	42	2
Ban Tub Nua	Royal Thai Air Force, King's Foundation, & Princess Foundation	Ranong	Muslim	Fishing	N/A	69	1

3.2 What processes did the organizations use to plan and implement reconstruction in the Ranong and Phang Nga provinces?

In order to explore how the social vulnerabilities arose from the reconstruction effort, we needed to understand the processes used by organizations that brought about these vulnerabilities. We needed to identify which organizations performed reconstruction in the Ranong and Phang Nga provinces. We were able to specifically identify some organizations that performed reconstruction in Ranong and Phang Nga by utilizing the resources available on D-TRAC's website, as described in Section 2.2.3. In order to gather information about the reconstruction from different perspectives, we interviewed reconstruction organizations and villagers, where possible.

3.2.1 Interviews with Organizations

When interviewing reconstruction organizations we wanted to interview representatives of organizations from our case studies, as well as other organizations to understand the reconstruction at both in-depth and broad levels. We were only able to interview one organization that performed reconstruction in our case study villages – the Bureau of Architecture in the Ministry of Interior's Department of Public Works, who developed the designs for the houses built by the Thai government. To gain a broader sense of the reconstruction, we also interviewed representatives from additional organizations – Habitat for Humanity and Save Andaman.

For each interview, we used a semi-structured format, which allowed us to ask structured questions but also ask other questions based on the responses of the interviewees (Knight, 2002). Therefore, we were not locked into a formal interview structure. For each organization, we tried to interview the director of the organization or the administrator of the reconstruction effort, but when this was not possible we interviewed a representative who had been working at the organization at the time of the reconstruction effort. Of course one person is not a sufficient sample size, but we felt that the director or administrator of the organization would know enough details about the reconstruction effort necessary for our purposes, and would also be well qualified to answer our interview questions. We interviewed Osoth Golaving, the director of Habitat

for Humanity, Duangkamel ("Oy") Sirisook, a representative from Save Andaman, and Suchart Trisatayapan, the director of the Bureau of Architecture.

The interview questions we asked related to how the reconstruction was planned, organized, and performed. Due to time constraints, we could not study all aspects of the reconstruction effort. Therefore, we chose to focus on three processes that previous research has shown to be important for organizations to consider in order to reduce social vulnerabilities, as discussed in Section 2.3:

- community involvement with design,
- community involvement with construction, and
- consideration of social demographics of the villagers.

Community involvement with the design of the houses helps to ensure that the houses meet the community's needs. Community involvement in both the design and construction phases may better provide the affected people with the ability to maintain and repair their houses in the future, without depending on outside organizations. Another way to help ensure that the reconstructed houses will meet the needs of the community is for organizations to consider the unique social demographics of the village. The semi-structured interview questions we used focused around these three reconstruction approaches and may be seen in Appendix A.

3.2.2 Interviews with Villagers

Along with interviewing reconstruction organizations, we also wanted to understand the reconstruction from the perspective of the villagers. In order to accomplish this, we used semi-structured interviews with villagers from each studied village and surveyed fifteen villagers in Ban Talay Nok, asking them questions about the processes described above. The interview questions can be seen in Appendix B and the survey questions can be seen in Appendix C (a Thai-version may be seen in Appendix D). The number of villagers interviewed from each village is described in Section 3.1 and can be seen in Table 4.

We used convenience sampling to choose villagers for the interviews and surveys. With convenience sampling we interviewed only those villagers available to participate (Knight, 2002). Convenience sampling was used because we were not able to set up

interview times with individual villagers prior to visiting the villages. Therefore, we went to the villages and interviewed villagers who were available to participate. The exceptions to this were our interviews with the heads of villages, which were established prior to our village visits by our contacts Bodhi Garrett of NATR and Chris Dunbar of USAID.

The questions asked were in the villagers' native language – Thai – and therefore we needed to employ the use of a translator. Our liaison, Aacaan Absornsuda Siripong, accompanied us on our trip to the villages to act as a translator. As with any studies involving translations, some of our interview questions and responses could have been misunderstood, affecting the validity of our findings.

Participants were not read consent forms because we felt that participation in our interviews and surveys was in no way dangerous to the villagers. In order to maintain confidentiality, we will not disclose villagers' names within our report.

3.2.3 Analysis

In order to analyze the data obtained from our interviews with villagers and representatives of reconstruction organizations we used coding methods established by grounded theory. Grounded theory describes a set of procedures that allow a researcher to develop concepts and theories from qualitative data (Corbin & Strauss, 1990). First, we developed concepts that described the data we gathered from our interviews. Concepts became more important if they were repeatedly present in more than one interview. Then, we developed categories that described various concepts and grouped each concept into the appropriate category. For example, one of our categories was "some organizations involved villagers in the reconstruction process," where concepts such as "the Thai government did not involve villagers in the design of the houses" were grouped. In order to ensure that concepts were grouped into the appropriate categories, constant comparisons were made between concepts to determine similarities and differences (Corbin & Strauss, 1990).

3.3 What changes to the villagers' social vulnerabilities occurred after the tsunami?

We needed to understand the changes to villagers' social vulnerabilities to explore how these were brought about by the reconstruction effort. To identify the changes in social vulnerabilities, we performed field work in the villages specified as case studies, using semi-structured interviews to gather the information we needed, as described previously. Ideally we would have liked to use focus groups to gather more data from a wider sample, but given our time constraints, semi-structured interviews were the best option.

In the studied villages we used convenience sampling because we were not able to establish interviews with villagers prior to our visits, as described above. In order to choose individuals for our interviews, we asked villagers we saw if they were available to be interviewed. The number of villagers interviewed in each village is described in Section 3.1 and can be seen in Table 4.

The questions we asked villagers were in Thai, translated by our liaison, Aacaan Absornsuda Siripong. The interview questions (found in Appendix B) allowed us to identify the social vulnerabilities that villagers experienced and were based on our hypotheses about social vulnerabilities that we expected to see in the villages – mainly social dependency and increased economic strain. We hypothesized that villagers may have experienced an increase in social dependency and/or vulnerability to economic stresses due to the materials or construction techniques used by organizations.

We used coding methods described by grounded theory to analyze the data we obtained from these interviews, as described in the previous section. To analyze the data obtained from our surveys, we compiled survey results into a spreadsheet, totaling the number of responses for each survey question. Then, we calculated the percentages of responses for each question.

3.4 How are the changes in social vulnerabilities related to the reconstruction approaches used by the organizations?

Understanding the connections between the changes in social vulnerabilities and the reconstruction approaches used by organizations required us to perform an analysis of

how the reconstruction approaches may have caused the changes in social vulnerabilities. From semi-structured interviews with relief organizations and villagers we learned which reconstruction approaches were used in the villages studied, as well as some additional villages. Also, we learned what changes in social vulnerabilities the villagers are experiencing by performing semi-structured interviews with villagers. In order to organize the information we gathered, we created a database capable of sorting village information in a way that allows reconstruction approaches in various villages to be easily viewed and compared.

Our group was not able to gather data for every village affected by the tsunami, rather we set in place a system that contains some of this information and allows comparisons to be made. The database contains the information we gathered from our interviews with organizations and villagers about the reconstruction approaches used. It also contains information regarding additional villages and organizations that we have gathered from DTRAC (as described in Section 2.2.3).

Our database was created using Microsoft Access 2003. Each village is represented by a village data-sheet that contains facts about the reconstruction (which organization reconstructed each village and what processes were used) and some statistics regarding the village, such as tsunami damage facts and village population. These village data-sheets are stored within the database and are available either by searching for reconstruction organization, village, or province. The inner-workings of our database may be seen in Figure 6.

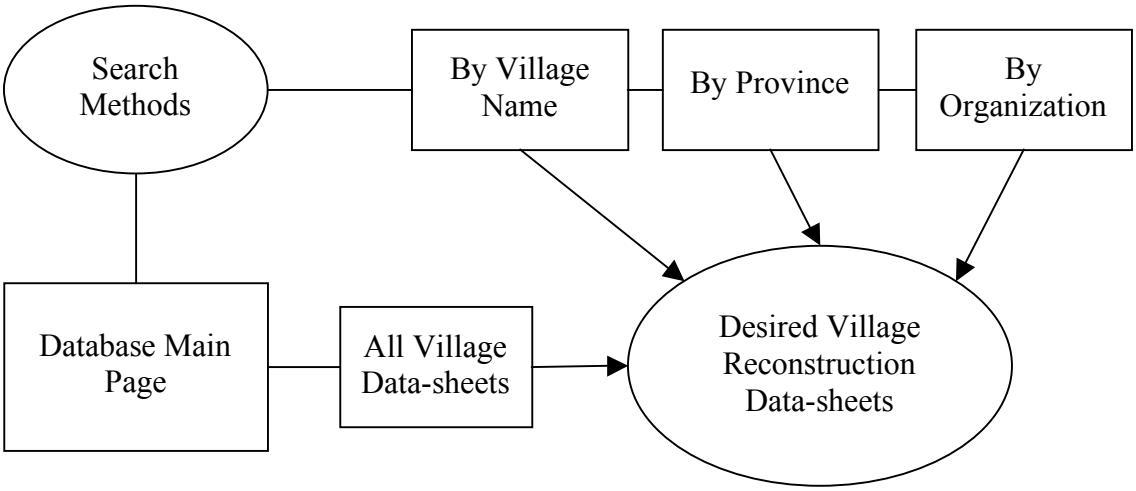

Figure 6: Database Outline

Once the database was populated with information from our data sources, we were able to identify common reconstruction approaches that were used by government agencies and NGOs. We generated a list of the reconstruction approaches used by these organizations and a list of the changes in social vulnerabilities we observed. These two lists were compiled independently of each other. We needed to identify the specific reconstruction approaches that had caused each change in social vulnerability. This was done by taking each of the observed changes in social vulnerabilities and matching them with a specific reconstruction approach. We were able to match the changes in vulnerabilities to the reconstruction approaches by utilizing information gathered from our background research, such as knowing that a certain reconstruction approach may cause a certain change in vulnerability, and by comparing common themes throughout our data. For example, if we noticed that two villages experienced a specific change in social vulnerabilities and also had the same reconstruction approaches we could draw the conclusion that these approaches may have caused the observed vulnerabilities. In some cases, we identified reconstruction approaches that did not coincide with any of the changes in social vulnerabilities we observed or vice versa, meaning that our research was not conclusive.

From our findings about the changes in social vulnerabilities, we were also able to infer the important types of social demographics that mediated changes in these

vulnerabilities. To do this, we extracted information regarding specific social demographics that influenced specific changes in vulnerabilities. These social demographics were identified by asking villagers more probing questions. For example, if they stated that they were dissatisfied with a particular aspect of their house, we would ask them why they were dissatisfied in order to understand if it had any relation to a social demographic.

3.5 Summary

By answering our research questions, we have gathered the information that we needed about the reconstruction effort to identify the important social demographics that mediated the changes in social vulnerabilities and also to form relationships between the changes in social vulnerabilities and the reconstruction approaches used by organizations. We performed semi-structured interviews with the relief organizations that performed reconstruction in order to understand the processes used. We used semi-structured interviews with the villagers to identify the changes in social vulnerabilities that villagers are facing since the tsunami. In order to organize the data we have gathered, we created a database containing village names, organizations that performed reconstruction, the reconstruction processes used, and information regarding the changes in social vulnerabilities. By analyzing the data we have collected, we were able to establish relationships between the reconstruction approaches used and the changes in social vulnerabilities and to identify the important social demographics that may have mediated these changes.

4 Findings and Discussion

This chapter will first present our findings in regards to the reconstruction approaches used by organizations, followed by findings regarding the changes in social vulnerabilities experienced by villagers. The last section in this chapter will provide an analysis of the relationships between the reconstruction approaches and the changes in social vulnerabilities, explaining how these approaches are related to the changes in social vulnerabilities.

4.1 Reconstruction Approaches Used by Organizations

This section presents our findings about the approaches used by organizations to plan and implement the reconstruction.

4.1.1 Finding #1: The involvement of villagers in the design and/or physical reconstruction of the houses varied by organization.

We have found that some reconstruction organizations involved villagers in the design and/or physical reconstruction of the houses, while others did not. The level of villager involvement varied depending on organization. This section will describe the level of villager involvement used by each organization studied, as well as the process by which they involved villagers in the design and construction of the houses.

Rotary Club of Patong Beach. The village of Pak Triam was reconstructed by the Rotary Club of Patong Beach. During our site visit, villagers explained that each villager designed and physically constructed his or her own house. Villagers told us that the Rotary Club provided them with the materials needed for reconstruction, such as concrete, wooden beams, and thatching materials, from which they were able to choose the best materials for their houses. The process, as described by villagers, was that the entire community, along with some volunteers, helped each other build the houses. The result of the reconstruction is very different from other villages we have observed because each villager's house is unique. For example, some houses had an open ground floor, while others had enclosed ground floors and some had glass windows and concrete walls, while others were constructed with only wooden materials. An example of a house in Ban Pak Triam can be seen in Figure 7.

Figure 7: House Built by Rotary Club of Patong Beach in Ban Pak Triam

Habitat for Humanity. Osoth Golaving, the director of Habitat for Humanity, informed us that villagers participated both in the design and construction of their houses in the provinces of Ranong and Phang Nga (see Appendix E for complete details). Habitat for Humanity met with the home owners and community leaders to determine the design of the houses and the appropriate materials to use. Villagers were able to choose between concrete or wooden materials. Also, each villager was required to participate in the physical construction of his or her house for a minimum of 50 hours, as described by Osoth. To ensure that this requirement was met, each villager agreed to a contract stating that they had to participate in the construction for 50 hours.

Secours Populaire Française (SPF). The village of Ban Tarnkirin, located in the Phang Nga province, was reconstructed by SPF. The head of the village stated that he alone was allowed to help design the houses. We were not able to gather any information about how much input the head of the village actually had in the design. The villagers themselves were not involved in the physical construction of the houses. The houses in Ban Tarnkirin are all one story, with an open patio, and an overhanging roof, as seen in Figure 8.

Figure 8: Standard House Built by SPF in Ban Tarnkirin

Catholic Mission of Surat Thani. The Catholic Mission of Surat Thani reconstructed Chum Chon Tap-Parat, where the villagers stated that they (as a whole) were able to choose between two designs – a one story house or a two story house. Villagers were also able to choose the color of the paint for the houses. Villagers mentioned that they helped move construction materials during the physical construction of the houses, but were not directly involved in the building of their houses. The houses in Chum Chon Tap-Parat were simple, one story houses, as seen in Figure 9.

Figure 9: Standard House Built by the Catholic Mission of Surat Thani in Chum Chon Tap-Parat

Thai Government. The villages that we studied that were reconstructed by the Thai government were Ban Talay Nok, Ban Tub Nua, and Ban Chai Pattana. All villagers interviewed in these villages, including the head of the village in Ban Chai

Pattana and Ban Talay Nok, said that they did not have any involvement in the design and construction of the houses. They explained that the houses were built by the Royal Thai Air Force and then given to them. Also, out of the 15 villagers surveyed in Ban Talay Nok, none of the villagers said they were involved in the design or construction of their houses. On the other hand, Suchart Trisatayapan, head of the Bureau of Architecture in the Ministry of Interior, explained that after the tsunami, representatives went to the villages to ask villagers for input on the reconstructed houses. He stated that three or four plans were made for the houses and villagers were able to choose between these plans. He also explained that villagers were able to provide some input during the construction process in order to make small changes to the houses. From our research, it seems as though the proposed processes did not actually occur in these villages. This lack of consistency with our data is further explained in Finding #3 below, which discusses the lack of reconstruction coordination.

The houses constructed by the Thai government (found in Figure 10 and Figure 11) were two stories, with an open ground floor.

Figure 10: Standard House Built by the Thai Government in Ban Chai Pattana

Figure 11: Standard House Built by the Thai Government in Ban Talay Nok

Save Andaman. Save Andaman worked in many villages in all six tsunami-affected provinces (see Appendix E for complete details), involving villagers in both the design of the houses and the physical construction. Duangkamel ("Oy") Sirisook, a representative from Save Andaman, explained that Save Andaman organized community meetings in order to discuss the design of the houses. Save Andaman would then negotiate the design and materials with the community, based on the budget for the project. Oy told us that Save Andaman felt that it was important for villagers to be involved in the design of the houses to ensure that the houses met the community's needs and to instill a sense of ownership within the community.

4.1.2 Finding #2: Some villages were relocated due to land ownership and/or safety issues.

Ban Chai Pattana, Ban Tarnkirin, Chum Chon Tap-Parat, Ban Talay Nok, and Ban Pak Triam were relocated either due to land ownership or safety issues. Ban Tarnkirin, Ban Chai Pattana, and Chum Chon Tap-Parat were relocated from Patong Island to the mainland. As explained by villagers, the decision to relocate these villages was made by the government, which felt that Patong Island was unsafe because the villages were located within the tsunami inundation zone. For reasons described in

Finding #3, it is unclear what part of government was responsible for making this decision.

Ban Pak Triam was also moved from an island (Nang Dam Island) to the mainland, although the reasons for this relocation are unknown. The relocation may have been decided upon by the government or by villagers themselves. Villagers in Ban Pak Triam did explain that they were able to choose the new location of their village based on a few choices, but it is unclear to us who presented them these choices.

The situation in Ban Talay Nok was different than that of Ban Chai Pattana, Ban Tarnkirin, and Chumchon Tap-Parat. Prior to the tsunami, the tsunami-affected villagers of Ban Talay Nok used to live along the beach, which is national park land owned by the government, while other villagers lived a few hundred meters inland. The reconstructed houses could not be placed in the same location because it is illegal for residents to live on land owned by the government. The head of the village in Ban Talay Nok explained that land within the main section of the village (a few hundred meters from the beach) was purchased by the Border Police and some villagers for the reconstruction of the destroyed houses.

4.1.3 Finding #3: Throughout the reconstruction effort, there was little coordination among government agencies.

Throughout our project, we have found that there was little coordination, if any, between the different government agencies involved in the reconstruction effort. Although we were not able to completely sort out the approaches used by the Thai government to plan and implement the reconstruction of the government-built houses, we have found that there were miscommunications between various government agencies.

The Bureau of Architecture in the Ministry of Interior's Department of Public Works was responsible for creating the designs for the houses. According to Suchart Trisatayapan of the Bureau of Architecture, the designs were then passed on to the Royal Thai Air Force, Military, and other government agencies that performed the construction of the houses. He said that about three or four designs were created, so that villagers could choose the design that they wanted.

When we interviewed the director of the Ranong provincial office, he explained that the Royal Thai Air Force chose the house designs. It seems that there was some confusion between what the central government wanted and what actually happened at the provincial level.

When we consulted villagers in our case study villages, it seemed as though the approaches described to us by government officials were not consistently followed by those performing the physical construction of the houses. In all of the villages we studied that were rebuilt by the government, all of the villagers interviewed and surveyed told us that they had no choice in the design of their house, which is inconsistent with the processes Suchart Trisatayapan had described to us. Also, he said that as the workers were building the houses, villagers could tell them to change small things about the houses. However, all of the villagers surveyed said that they were not involved in the construction of the houses. From the information we have gathered, it seems as though there is a disconnect between what some government officials say and what villagers say about the reconstruction.

4.1.4 Finding #4: There was little coordination between government agencies and NGOs.

We have found that there was almost no coordination between the Thai government and NGOs. As explained in Sections 2.2.2 and 2.2.3, the government did not work with NGOs during the reconstruction effort because they did not want to violate the former Prime Minister's policies. Despite the Prime Minister's requests, many NGOs still performed reconstruction in tsunami-affected areas.

As Suchart Trisatayapan of the Bureau of Architecture explained, the governor of each province decided which organizations would perform reconstruction in specific villages. The lack of communication between the provincial offices and central government resulted in little, if any, record keeping for the reconstruction. When we talked to the Department of Disaster Prevention and Mitigation (DDPM) and Bureau of Architecture both in the Ministry of Interior, they both explained that records of which organizations worked in each village would be dispersed throughout the provincial offices, which they said may be hard to locate. According to the DDPM, the central

government did not keep records of the organizations participating in the reconstruction effort because government officials did not want to violate the former Prime Minister's policy of refusing aid.

The director of the Bureau of Architecture, Suchart Trisatayapan, explained that NGOs could obtain the designs used for the government-built houses if they also wanted to follow these designs. In order to do this, NGOs needed to contact the Bureau of Architecture and request the designs. From what we have found, it appears that this was the only contact the central government had with any NGOs that performed reconstruction.

4.1.5 Finding #5: In some cases, government agencies and NGOs may have used unsafe materials or poor construction techniques.

In our case study villages, we found that some of the houses may be unsafe or poorly constructed. In Chum Chon Tap-Parat drop ceilings were used both for the inside of the houses and for the ceiling over the outdoor patio. Due to high wind forces in the area, the tiles on the ceiling were already falling down, as seen in Figure 12, even though villagers had been living in the houses for only two weeks prior to our visit.

Figure 12: Displaced Ceiling Tiles in Chum Chon Tap-Parat

In Ban Tub Nua, the villager we interview showed us that the railing on the stairs was unstable because it could be easily moved with minimal force. Also, he believes that the wood used for the stairs was not the best quality. This villager also mentioned that the second story was unstable, which may be due to the fact that the floor was not reinforced with cross supporting beams as seen in Figure 13. DeMasi et al. (2005) had

also noticed this problem in their study of Ban Tub Nua and Ban Hat Sai Khao in the Ranong province. They found that the second story of the reconstructed houses was unstable due to a lack of cross-supporting beams.

Figure 13: Non-Reinforced Second Story in Ban Tub Nua

The head of the village interviewed in Ban Tarnkirin explained to us that many villagers' houses had cracks and leaks in the walls and ceilings, which he believes were due to poor construction techniques.

In the cases of the houses built by the Thai government, Suchart Trisatayapan told us that the roofs were built with asbestos. Asbestos is a material made of asbestos fibers, which can cause an increased risk of lung cancer, cancer of the chest or abdominal cavity, or increased scarred tissue in the lungs. Asbestos is only dangerous if the material is disturbed, by water damage, heavy air flow, hitting, rubbing, etc and then inhaled. When disturbed asbestos fibers are released into the air, thus increasing the likelihood of the fibers being inhaled (Environmental Protection Agency [EPA], 2006). Since the Ranong and Phang Nga provinces receive the most rain in Thailand, it seems very likely that asbestos fibers could be disturbed, which could cause health problems for these villagers.

The Thai government did try to take into consideration the safety of the villages with a two story house design that was intended to be more tsunami resistant. Suchart Trisatayapan from the Bureau of Architecture explained that the ground floor was left open with the hopes that water from a future tsunami would be able to flow under the house. Whether or not the open ground floor will actually decrease damage in the event of a future tsunami is unknown. When we asked the Department of Disaster Prevention and Mitigation if the two story design was meant to be more tsunami resistant they told

us that nothing the government could build would be tsunami resistant. They also explained that the government's focus was not on making structures tsunami resistant, but rather was on increasing the affected communities' preparedness by installing warning towers and establishing appropriate evacuation routes and procedures.

4.1.6 Finding #6: In addition to rebuilding houses, some organizations have helped to restore villagers' livelihoods.

Some of the organizations that we studied, such as Save Andaman, helped to restore villagers' livelihoods in addition to reconstructing houses. Also, North Andaman Tsunami Relief Foundation (NATR) and USAID are two other organizations that did not perform reconstruction, but focused mainly on restoring livelihoods. After the tsunami, Save Andaman worked with the Federation of Southern Fisherfolk to set up revolving funds within the local fishing communities. The revolving fund provides fishermen with the money necessary to repair or rebuild their boats. Fishermen would then replace this money so that it can be loaned out to others who are still in need of boats. Besides occupational rehabilitation, Save Andaman also helped some communities settle land ownership disputes by providing them with lawyers that can negotiate these disputes for the villagers. Most of the land disputes are between fishermen and the government, who mandate the coastline is national park land, or between fishermen and private parties, who claim they own the land along the coast.

Similar to Save Andaman, other organizations, such as NATR and USAID, have helped to restore livelihoods. NATR provides occupational rehabilitation to many fishermen in the Ranong and Phang Nga provinces by helping them salvage and repair boats. They help communities set up eco-tourism systems, where villagers can produce handicrafts, such as hand made soaps, for tourists to buy. NATR also provides education in English and computers for villagers at their education center in the Khuraburi district of Phang Nga.

USAID helped to perform needs assessments directly after the tsunami. Following the immediate disaster relief, they have tried to help five villages in the Ranong province diversify their livelihoods, which they believe will help reduce the impact of the tsunami and possibly any future disasters. They have led community based

training sessions to teach the community about alternative livelihoods. They have trained many villagers about small business ownership and provided them loans through a revolving fund, similar to Save Andaman's system. According to Chris Dunbar of USAID, the development of new livelihoods will help these villagers recover from the effects of the tsunami by providing them with new means of income.

We hypothesize that by restoring livelihoods, these organizations have helped alleviate increases in social vulnerabilities that were brought about by the reconstructed houses. For example, we have found that in some cases relocation of villages has caused occupational shifts because many fishermen are now further from the ocean, as discussed below in Finding #9. Organizations, such as USAID, NATR, and Save Andaman, may have helped decrease vulnerabilities due to occupational shifts by providing them with alternative livelihoods and repairing boats. Since we were unable to fully explore the connections between livelihood restoration, reconstruction, and changes in social vulnerabilities, we will offer recommendations for researchers to explore this in the next chapter.

4.2 Changes in Social Vulnerabilities Experienced by Villagers

This section presents our findings in regards to the social vulnerabilities experienced by villagers in our case study villages.

4.2.1 Finding #7: Some villagers are unable to perform repairs and make modifications on their new houses, therefore increasing their dependency on others.

Through our field work, we have found that many villagers are unable to perform necessary repairs and make modifications on their houses due to the differences in construction techniques and materials. In many cases, the new houses are made of concrete and other materials that are foreign to villagers, whereas their old houses were made of wood. Most of the villagers we interviewed do not know how to fix problems that may occur with their new houses or do not know where to obtain the appropriate materials, causing them to rely on outside labor, which increases their level of social vulnerability.

Some villagers stated that they had worked with concrete before, but most felt they did not have the knowledge to construct with concrete. In Ban Talay Nok, which was reconstructed by the Thai government, the villager we interviewed did not know where to obtain concrete. Also, he said that if he could purchase concrete, he would not know how to build with it. He explained that most villagers could make simple repairs and additions, such as a thatched roof extension (which he himself built on his house), but could not build more complex things with concrete, such as a wall to enclose the ground floor (which he hired an outside agency to build for him). A picture of this villagers' house can be seen in Figure 14, where the thatched roof extends off the front of the house and the enclosed concrete wall can be seen on the right side of the house. Of the villagers surveyed in Ban Talay Nok, 73% said they do have knowledge of the construction techniques and materials, but 71% said they were unable to obtain the materials necessary to modify and perform repairs on their houses.

Figure 14: Additions on a House in Ban Talay Nok

The head of the village in Ban Tarnkirin said that their houses were in need of repair because there were cracks in the walls and ceilings. However, villagers do not know how to fix these problems themselves and do not have enough money to hire anyone to make repairs. They have contacted the organization that performed reconstruction in this village (SPF), but it has not yet come to repair the houses.

In most cases villagers stated that they were more self-sufficient before the tsunami and were able to perform repairs and maintenance on their houses. Now

villagers' social vulnerabilities have increased because they are more dependent on outside help and non-local resources.

4.2.2 Finding #8: Some reconstructed houses do not meet the specific needs and wants of the villagers. Consequently, some villagers have made modifications to their homes.

In our case studies in Ranong and Phang Nga, we found many cases of houses that simply did not meet some of the basic needs of the villagers. Of the villages studied, the houses in Ban Chai Pattana, Ban Tub Nua, and Ban Talay Nok, were all two stories tall. The villagers interviewed in Ban Chai Pattana stated that they would have preferred a one story house and those in Ban Talay Nok plainly stated they did not want two stories. All of the villagers interviewed in Ban Chai Pattana and Ban Talay Nok mentioned that a two story house makes it difficult for the elderly to climb the stairs to the second floor. It was not possible for elderly to live on the bottom floor of the standard house since it was not enclosed. (Photos of the standard houses built by the Thai government can be seen in Figure 10 and Figure 11.)

One family we interviewed in Ban Talay Nok built an addition to their house to enclose the first floor so elderly members of their household could sleep on the ground floor. The addition consisted of a concrete wall and a thatched roof to provide additional shade and shelter from the elements, as shown in Figure 14 in the previous section.

In comparison to the villages of Ban Chai Pattana, Ban Tub Nua, and Ban Talay Nok, which were all built by the Thai government, Ban Tarnkirin and Chum Chon Tap-Parat contained one story houses. The head of the village in Ban Tarnkirin and the villager in Chum Chon Tap-Parat both stated that the villagers chose a one story house because they felt two story houses were a problem for the elderly.

Another issue that many villagers interviewed in Ban Chai Pattana, Ban Tub Nua, and Ban Talay Nok mentioned was that the kitchens were built in the open ground floor, causing problems during the rainy season. An open kitchen is a problem because, according to Aacaan Absornsuda Siripong, Ranong and northern Pang Nga have an eight month long rainy season, with the highest annual rainfall in Thailand. Bodhi Garrett of NATR also explained that in some villages, the rain splashes off the roofs of houses into

the open floor of adjacent houses. Although we were not able to verify this comment with our village visits, it appears that this could be a problem in our case study villages because the roofs of the houses are slanted at steep angles that, in some cases, were further extended by their owners, as seen in Figure 15.

To address this problem, some villagers have enclosed the first floor. The family that was interviewed in Ban Talay Nok explained that the open kitchen was another reason they added the addition to enclose the ground floor of the house (seen in Figure 14). The head of the village interviewed in Ban Chai Pattana mentioned that in other cases, villagers may string up fabric and plastic tarpaulins between poles in the rainy season, as seen in the second story of the house in Figure 15 below. Some villagers may also build additions out of traditional materials, such as the roof extension shown in Figure 14. The villagers interviewed in Ban Talay Nok and Ban Chai Pattana both stated that in the old houses, the kitchens were inside.

Figure 15: Tarpaulins on House in Ban Talay Nok

In many of the houses reconstructed by the Thai government, there were also problems with the lot sizes of the houses limiting villagers' ability to do subsistence farm or raise livestock. Some families used to rely on subsistence farming, such as fruit trees in their yards, for additional income and/or food. The villagers interviewed in Ban Talay Nok and Ban Tub Nua explained that they are no longer able to do this because they do not have enough land. The family interviewed in Ban Talay Nok used to raise chicken and other small livestock to sell, but they are no longer able to do so due to space

constraints. These villagers are now less self-sufficient because they must be more dependent on outside resources for fruits and vegetables, increasing their social vulnerabilities.

Through surveys given to fifteen villagers in Ban Talay Nok, we have found that many of the villagers feel their houses aren't large enough to meet their needs. Twelve of the fifteen (80%) villagers felt that their new houses did not provide them with sufficient space for their family's living needs, as seen in Figure 16. Of the three villagers who felt that they had sufficient living space, two have made additions to their houses. Also, eleven villagers (73%) said that their new houses were smaller than their old, while only four (27%) said they were about the same size. These results show that many villagers in Ban Talay Nok do not feel their houses are large enough to suit their needs. It is also important to note that seven of the fifteen villagers surveyed (47%) have made additions to their homes, although the reasons for the additions are unknown.

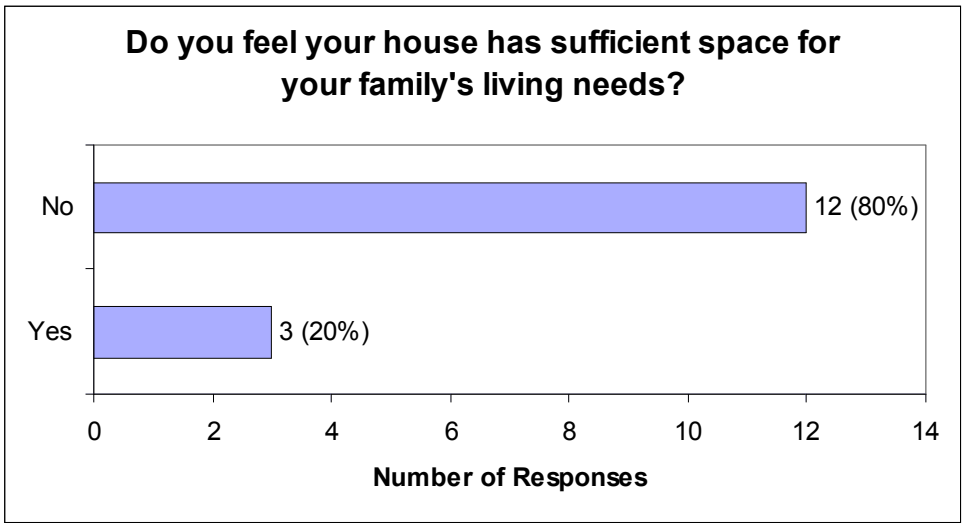

Figure 16: Villagers' Perception of Sufficient Living Space in Ban Talay Nok

4.2.3 Finding #9: When villagers were relocated from coastal areas, they experienced changes in social vulnerabilities.

Five of the six villages studied were relocated (Ban Tub Nua being the exception). Ban Tarnkirin, Ban Chai Pattana, and Chum Chon Tap-Parat were relocated from Patong Island to the mainland, Ban Pak Triam was relocated from Nang Dam Island to the mainland, and Ban Talay Nok was relocated from the beach towards center of the village.

Due to relocation some villages are now further from the sea, causing a disruption to their livelihoods and increasing their vulnerability to economic stress. Each of the villages studied were fishing villages which were located very close to the water before the tsunami. While this location made them extremely vulnerable to tsunamis it was ideal for fishing, which is the primary source of income for these villages. In Ban Tarnkirin, Ban Chai Pattana, Chum Chon Tap-Parat, and Ban Pak Triam (all of which were relocated from an island to the mainland) villagers are between 300 meters to ½ kilometer from their piers and in some cases, such as in Ban Chai Pattana, they must now travel to the pier on motorcycles. Once they reach the piers they must travel a significant amount of time in their boats (villagers told us from 15 minutes to an hour) to get from the port to the open water where they can fish. In Ban Tarnkirin and Chum Chon Tap-Parat the interviewed villagers expressed concern that it is more difficult to fish since they must now travel farther to reach the open water.

Since villagers are further from the sea they are not able to spend as much time fishing as they used to. This problem is made even worse by the odd weather that has been occurring this year – some villagers told us that they are less likely to go fishing if the weather seems unpleasant. Also, some villagers are not able to fish as frequently because they cannot travel to and from their ports through the canal during low tide. When we interviewed the head of the village of Ban Tarnkirin he stated that the income from fishing is now half of what it was when they lived on Patong Island. This decrease in income has caused an increased economic strain on the residents because they are not able to make as much money fishing as they were prior to the tsunami. This may increase their social dependency if they must rely on others for extra money or additional means of income.

Although Ban Talay Nok was also relocated from a coastal area these villagers were only moved a few hundred meters from the coast to the center of the village. Villagers must now walk farther to reach the ocean than they did before the tsunami, but in comparison to other villages they do not have to travel through canals to reach the open water. The villager interviewed in Ban Talay Nok said that he did not have any problems fishing in his new location.

In the villages that were relocated to the mainland from islands many villagers interviewed expressed concern that the cost of living is now higher, therefore increasing their vulnerabilities to economic strain. Villagers in Ban Tarnkirin and Chum Chon Tap-Parat mentioned that food is more expensive on the mainland. The interviewed villagers in Chum Chon Tap-Parat said that they now have to travel to Kuraburi Market to buy food, where it is more expensive than on the island. For some of the villages the market is also further away from their houses, which increases transportation costs. Additionally, the head of the village in Ban Tarnkirin explained that villagers are paying more for electrical bills and supplies to maintain their new houses. When this increased cost of living is coupled with the decreased income, which many villagers are now facing due to relocation, it is evident that there has been an increase in their social vulnerabilities.

On the other hand, the relocation of villages has helped many villagers by providing them with land ownership. In the case of Ban Talay Nok, prior to the tsunami the houses were located along the beach (a few kilometers from the center of town), which is national park land and is owned by the government. According to Thai law it is illegal to build on national park land, leaving villagers vulnerable to eviction and losing their homes. Unlike losing their houses from a natural disaster, if evicted from the land villagers would not necessarily get the assistance needed to rebuild their houses. After the tsunami a piece of land located near the center of town was purchased and donated by the Border Police and a few of the villagers. Once the houses were reconstructed each villager was given ownership of the land on which his or her house was constructed. Land ownership reduces villagers' vulnerabilities by increasing their assets by providing them with a piece of land that cannot be taken away from them. When the head of the village was interviewed he emphasized repeatedly that the villagers are very lucky to now own their land.

Similarly, with Ban Pak Triam the village was moved from Nang Dam Island to the mainland. A piece of land was purchased by the Rotary Club of Patong Beach and the ownership of the land was given to the community as a whole. According to the villagers interviewed this system has worked very well for them.

One of the villagers interviewed Ban Chai Pattana told us that life on the island was very simple and life on the mainland may be more expensive, but she feels that it is better because it makes them more modernized. All of the villagers interviewed from Ban Tarnkirin, Chum Chon Tap-Parat, and Ban Chai Pattana mentioned that they were grateful for the education system on the mainland. According to those interviewed the schools on the mainland are much better than those on Patong Island. Villagers in Ban Tarnkirin and Chum Chon Tap-Parat also explained that now schooling is free from kindergarten through primary school, which villagers are extremely thankful for. The increased access to and higher quality of education may reduce the villagers' social vulnerabilities in the future because it may provide younger generations with more occupational opportunities.

Psychologically, many villagers feel safer now that they live further from the water. The villagers interviewed in Ban Tarnkirin, Ban Chai Pattana, and Chum Chon Tap-Parat all stated that most villagers did not want to go back to Patong Island because they are afraid of a future tsunami. The villager interviewed in Ban Talay Nok stated that most villagers are afraid to go down the beach. Most of the villagers interviewed in Ban Pak Triam felt that they were much safer now that they are living on the mainland. The relocation has eased most villagers' minds by moving them away from the ocean and away from the threat of a future tsunami.

4.2.4 Finding #10: Some villagers do not trust the structural integrity of their houses.

Some villagers expressed concern regarding the structural integrity of their houses. The villager we interviewed in Ban Tub Nua stated that one of the reasons he does not go upstairs is because he does not trust the stability of the stairs and the railing. He demonstrated how unstable the railing was by moving it back and forth. This villager stated that he believed the quality of the wood used was not very good and he didn't trust it. In Ban Tarnkirin, the head of the village stated that many of the houses have developed cracks in the ceilings and walls, which has caused concern among some of the residents.

4.3 Analysis of the Relationships between Reconstruction Approaches and Changes in Villagers' Social Vulnerabilities

This section describes our analysis of the relationships between the reconstruction approaches used by the organizations and the changes in villagers' social vulnerabilities. This section explains how the changes in social vulnerabilities were brought about by the reconstruction approaches.

4.3.1 Finding #11: When villagers were not involved in the reconstruction process, most villagers became more dependent on others for house modifications and repair.

In our analysis we found that when villagers were not involved in the reconstruction process, as described in Finding #1, the houses were often built using construction techniques and materials that villagers were unfamiliar with. This means that they were more likely to be unable to perform repairs and make modifications on their houses, as described in Finding #7. In all of the six villages we visited, we noticed a trend between the level of villager involvement in the reconstruction and the villagers' abilities to perform the proper repairs on their houses. When villagers participated in the reconstruction we found that they were knowledgeable about the materials and construction techniques used, whereas when they did not participate that were much less knowledgeable.

For example, in Ban Tarnkirin, which was physically constructed without the help of the villagers, the head of the village stated that their houses were in need of repair due to poor construction. The houses had cracks and leaks in the ceilings and walls, but they do not know how to fix these problems themselves. The villagers in Tarnkirin have also tried to contact the reconstruction agency (SPF), but it has not yet come to make the repairs on the houses. These villagers must now rely on outside help to make necessary repairs on their houses, thus increasing their social dependency.

As described previously, the villager interviewed in Ban Talay Nok, which was reconstructed by the Thai government, did not know where to purchase concrete or how to construct with it. Also, 71% of villagers surveyed in Ban Talay Nok do not know

where to obtain the necessary materials to perform repairs. Congruent with our findings, villagers in Ban Talay Nok were not involved in the reconstruction effort.

In comparison, the villagers of Ban Pak Triam, who were able to individually design and construct their own houses, as described in Finding #1, are able to maintain and repair their houses. This practice ensures that they are knowledgeable about the materials and construction techniques used. Therefore, villagers of Ban Pak Triam are much less vulnerable to social dependency when compared to the other studied villages because they are able to repair and maintain their houses, without relying on outside help. A summary of villager involvement in the reconstruction effort and villagers' ability to make necessary repairs and modifications can be seen in Table 5.

Village	Villager Involvement	Ability to Make Repairs and Modifications
Ban Pak Triam	HIGH – villagers designed and built their own houses	HIGH – Can fix most problems that occur and make any needed modifications
Ban Tarnkirin	SOME – Head of the village participated in design process, villagers did not help in physical construction	LOW – Do not know how to fix problems
Ban Talay Nok	NONE	LOW – Can perform repairs with simple materials, but cannot use more complex materials and do not know where to obtain materials

Table 5: Summary of Villager Involvement and Villager Ability to Perform Repairs

4.3.2 Finding #12: When villagers were not involved in the reconstruction process, many villagers felt that their houses did not suit their needs and wants.

Our analysis shows that when villagers were not consulted about the design and layout of the houses, as described in Finding #1, the houses did not meet villagers' needs and wants, as described in Finding #8. In Ban Chai Pattana, Ban Talay Nok, and Ban Tub Nua, all of which were reconstructed by the Thai government, two story houses with open kitchens were constructed. This design caused problems during the rainy season and for elderly members of the community, as described in Finding #8. All of the villagers interviewed in both Ban Chai Pattana and Ban Talay Nok mentioned that two story houses were a problem for the elderly and that they would have preferred a one story house.

In contrast, the houses in Ban Tarnkirin and Chum Chon Tap-Parat were one story. In Ban Tarnkirin, the head of the village was able to give his input for the design of the houses. He stated that the villagers wanted a one story house because it was easier for elderly members of the village to move about. In the village of Chum Chon Tap-Parat, the villagers were given a choice between a one or two story house and they collectively chose the one story design because it was easier for the elderly to live in. In both of these cases, villagers were able to provide limited input for the design of the houses and thus the houses were better suited for the villagers' needs and wants. A summary of how well the needs and wants of the villagers were met by different levels of villager involvement can be seen in Table 6. As can be seen in the table there is a linear relationship between columns two and three, where the greater the level of villager involvement, the better villagers' needs and wants were met. On the other hand, there is an inversely linear relationship between columns two and four. As the level of villager involvement increased, villagers made fewer modifications because the houses better suited their needs.

Village	Villager Involvement	Were Needs/Wants Met?	Modifications Made As a Result?
Ban Chai Pattana	NONE	NO – Two stories and open ground floor caused problems	YES – Plastic Tarpaulins to prevent rain from entering ground floor
Ban Talay Nok	NONE	NO – Two stories and open ground floor caused problems	YES – Thatched roof extension, concrete wall to enclose ground floor
Ban Tarnkirin	SOME – Head of the village gave input for the design	YES – One story house is better for the elderly	NO
Chum Chon Tap-Parat	LOW – Chose between one and two story design and paint color	YES – One story house is better for the elderly	NO

Table 6: Summary of How Well Villager' Needs and Wants Were Met Through Villager Involvement

4.3.3 Finding #13: When villagers were relocated due to land ownership or safety issues, they experienced changes in social vulnerabilities.

As was stated in Finding #2, there were safety and land ownership issues that forced reconstruction organizations and government agencies to relocate some villages. However, many of these villagers are now experiencing changes in social vulnerabilities as a result. The most drastic changes in social vulnerabilities have occurred in the villages that have been relocated from an island to the mainland, as described in Finding

#9. These villagers are now further from the sea forcing them to travel longer distances to reach the open water where they can fish. Villagers are not able to fish as frequently as before, which has caused their incomes to decrease. Therefore, there has been an increase in villagers' vulnerability to loss of their livelihoods due to increased economic strain.

Also, the cost of living for many villagers has increased for many reasons, as described in Finding #9. With an increase in the cost of living and the decrease in income, many villagers are facing new economic strains as a direct result of the relocation.

As described in Finding #9, some aspects of the relocation have resulted in decreases in social vulnerabilities. In some cases villagers now own their own land, eliminating their vulnerability to eviction. Some villagers also expressed the feeling that the new location has made them more modernized, mainly because they feel the education system is better.

A summary of the changes in vulnerabilities that were brought about by village relocation can be seen in Table 7. As shown in the table, three out of the four villages that were relocated from islands to the mainland (Ban Chai Pattana, Chum Chon Tap-Parat, and Ban Tarnkirin) experienced occupational stresses and an increased economic strain. Also, two of the relocated villages (Ban Pak Triam and Ban Talay Nok) acquired land ownership as a result of the relocation.

Village	Relocated from	Relocated to	Occupational Stresses?	Increased Economic Strain?	Land Ownership?
Ban Chai Pattana	Patong Island	Mainland	YES	YES	NO
Chum Chon Tap-Parat	Patong Island	Mainland	YES	YES	NO
Ban Tarnkirin	Patong Island	Mainland	YES	YES	NO
Ban Pak Triam	Nang Dam Island	Mainland	NO	NO	YES
Ban Talay Nok	Beach	Center of village	NO	NO	YES

Table 7: Summary of Village Relocations and Resulting Changes in Vulnerabilities

4.3.4 Finding #14: We identified occupation, income, and family structure as being important social demographics that influenced changes in social vulnerabilities brought about by the reconstruction effort.

The changes in social vulnerabilities that were caused by the reconstruction approaches used were dependent on the specific social demographics of the people. These specific social demographics are: occupation, income, and family structure.

The first social demographic we identified that influenced the changes in social vulnerabilities is occupation. As shown in Finding #9, when villagers were relocated from an island to the mainland, they experienced changes in vulnerabilities due to their occupations. Since they were unable to fish as frequently as they could on the island, they had an increased vulnerability to economic stresses and an increased vulnerability to loss of livelihoods. If an alternative location was chosen, such as one that was more accessible to the sea, villagers may have not experienced these increases in vulnerabilities. These changes in vulnerabilities were a direct result of the location that was chosen and the ways that villagers had to interact with the new location in accordance to their occupation. On the other hand, if these villagers had an occupation that did not rely on their proximity to the sea, this location would not have caused these particular changes in vulnerabilities, but would have caused different changes in vulnerabilities. Thus, villagers' occupations as fishermen have influenced the specific changes in social vulnerabilities, noted above, that were brought about by the reconstruction effort.

The next social demographic that we identified that has influenced changes in social vulnerabilities was income. As described in Finding #7, some villagers were unable to purchase the necessary materials to repair their houses because they did not have enough money to do so, therefore increasing their vulnerabilities to dependency. Organizations' selection of materials may not have been appropriate because villagers' incomes do not allow them to purchase the proper materials to maintain their houses. In other cases, relocation of villages has caused an increase in the cost of living when they were relocated from an island to the mainland, therefore increasing their vulnerabilities to economic stresses. In both of these cases, villagers' incomes have influenced these specific changes in social vulnerabilities brought about by the reconstruction effort. If

their incomes had been different, the changes in social vulnerabilities experienced by villagers would also be different. For example, if villagers had a higher income then they would have had less of an increased vulnerability to economic stresses when moved to the mainland where the cost of living was higher.

The third social demographic that we have identified that has influenced changes in social vulnerabilities was family structure. As seen in Finding #8, all of the villagers interviewed in Ban Talay Nok, Ban Chai Pattana, and Ban Tub Nua mentioned that two story houses were a problem for the elderly. Also, most villagers surveyed in Ban Talay Nok believed their houses were too small for their needs. These results have helped us identify family structure, which we define as being family size and also age distributions in the family, as being an important factor in influencing changes in social vulnerabilities. In these cases, organizations' choices in the design of the houses did not adequately address villagers' family structures. If the family structure of the villagers had been different, then villagers would not be experiencing these same problems. For example, if there were no elderly people living in the villages, two story houses would not have been a problem.

4.4 Summary

Through an analysis of the reconstruction approaches used and the changes in social vulnerabilities villagers are experiencing, we have identified four major relationships between reconstruction approaches and changes in social vulnerabilities. The first relationship we have identified is that when villagers were not involved in the reconstruction process, most villagers became more dependent on others for house maintenance and repair. The next relationship is that when villagers were not involved in the reconstruction process, many villagers felt that their houses did not suit their needs and wants. We have found that without any input in the design of the houses, most organizations did not take into account the needs and wants of the villagers, resulting in such things as open kitchens, which cause problems during the rainy season, and two story houses, which cause problems for the elderly. The third relationship we identified is that when villagers were relocated due to land ownership or safety issues, they experienced both positive and negative changes in social vulnerabilities, ranging from

acquiring more modern houses or ownership of their land to occupational shifts and economic strains. The last relationship we identified is that when houses were built with unsafe construction techniques and materials, some villagers did not trust the structural integrity of the houses. Also, we have identified occupation, income, and family structure as being important social demographics that influenced the changes in social vulnerabilities brought about by the reconstruction effort.

In addition to forming the causal relationships described above, we have also identified some approaches used by organizations that address issues other than housing and are related to changes in social vulnerabilities. These reconstruction approaches are restoration of livelihoods, lack of coordination among government agencies, and lack of coordination between NGOs and government agencies. We have found that some organizations have helped to restore villagers' livelihoods, which we hypothesize has helped to reduce social vulnerabilities in these areas by alleviating some of the vulnerabilities brought about by the reconstructed houses.

We believe that the lack of coordination among government agencies has resulted in government-built houses that did not adequately address the needs and wants of the villagers and therefore caused an increase in social vulnerabilities. Additionally, there was little coordination between NGOs and government agencies, causing a disorganized reconstruction effort. Since we were not able to fully explore these reconstruction approaches, we will offer recommendations for future researchers to further explore them in the next chapter.

5 Recommendations

The findings presented in the last chapter have demonstrated that when certain reconstruction approaches were used, villagers' social vulnerabilities increased. When organizations did not involve villagers in the reconstruction, the houses did not suit the needs and wants of the villagers and also, villagers had an increased dependency on others for repairs. When villagers were relocated, they experienced changes in social vulnerabilities, such as an increased vulnerability to economic stresses. Also, we have identified occupation, income, and family structure as being important social demographics that influenced changes in social vulnerabilities.

Based on our findings and background research, we offer a series of recommendations for organizations and government agencies that perform post-disaster reconstruction as well as recommendations for future research. The first section below details our recommendations for organizations to help improve the outcomes of reconstruction in future efforts by ensuring that new homes better suit the needs of the residents and do not increase vulnerabilities. The second section outlines our recommendations for future research to explore gaps in information that we have identified, as well as continue our work to find themes that can be generalized throughout the reconstruction effort in Thailand.

5.1 Recommendations for Organizations and Government Agencies

Through our findings, we have identified some recommendations that should be implemented by organizations to improve future reconstruction efforts. These recommendations are presented below.

5.1.1 NGOs and/or government agencies should seek to involve the affected community in the design and physical construction of the houses.

Through our background research and field work, we have found that one of the most important, yet often overlooked aspects of reconstruction after a disaster is the

involvement of the community. The community should be involved in the design of the individual houses, house layout, as well as the physical construction of the houses. We have found that when villagers were involved in the reconstruction, the houses better suit their needs and villagers are less dependent on others for house repairs and modifications.

As described in Finding #11, we have found that when the community was not involved in the reconstruction process, villagers are more dependent on others for repairs and modifications. Congruent with the findings of DeMasi et al. (2006), our findings show that when villagers did not play a role in the reconstruction, they were often unable to repair and modify their homes because they had little or no knowledge of the materials and construction techniques used in their new homes. DeMasi et al. (2006) also showed that when villagers were not involved in the reconstruction, they did not have the knowledge to care for their new structures, causing them to rely more on outside help. This increased villagers' social vulnerability to dependency and in some cases, increased economic strain because some villagers could not afford to purchase materials or hire others for repairs. In order to ensure that villagers are able to properly maintain their houses in the future, we recommend that NGOs and government agencies involve villagers in the reconstruction.

Also, we found that when villagers were not involved in the reconstruction process, many villagers felt that their houses did not suit their needs and wants, as described in Finding #12. Our research demonstrates that in some cases, there were simple design flaws that created problems for villagers. For example, many houses had open kitchens, which caused problems for villagers in the rainy season. In other cases, houses were built with two stories in an attempt to make them tsunami resistant; however this made it difficult for elderly members of the family to access the second story.

Similar findings have also been identified by DeMasi et al. (2006), who found that when villagers were not involved in the reconstruction, the houses did not provide residents with sufficient space. These problems caused villagers to make additions to their houses, which in many cases increased their dependency because they had to rely on an outside organization to build the addition.

Past experiences have shown that involving the affected community in the reconstruction effort will ensure that the housing provided meets their needs (ALNAP,

2005). For example, the reconstruction effort in Turkey following an earthquake in 1970 did not involve the community. Many residents were dissatisfied with the design, layout, and placement of the houses provided to them and began rebuilding new houses on their own (Mitchell, 1967). On the other hand, when residents were able to design and construct their own house following an earthquake in Joyabaj, Guatemala, they were pleased with the outcomes (Anderson & Woodrow, 1989). This further demonstrates the fact that when the community is involved in the reconstruction process, the houses will better suit their needs.

The community can best be involved in the design of the houses through direct interviews with community members or focus groups held within the community. If it is impossible to speak to individual community members, community leaders, such as the head of the village, should be consulted because he/she can best communicate the community's needs (Walter, 2005, OECD, 1996).

Organizations can involve the community in the construction of the houses by requiring or requesting that each community member work a certain number of hours on the construction of their own home. This can be done through a written or verbal contract. This practice has been used by Habitat for Humanity, as described in Finding #1, and appears to have been successful.

5.1.2 If a community must be relocated, NGOs and/or government agencies should choose the location that minimizes negative impacts on residents' lives and livelihoods.

The location of a community is an important first step to reconstruction, and must be decided upon with as much care as any other major decisions. In some cases, it is necessary to relocate a community due to safety and/or land ownership issues, as demonstrated in Finding #2. All of the villages we studied that were relocated are now much safer than before the tsunami because they are no longer in the tsunami inundation zone. However, there can be negative consequences associated with relocation because of new economic stresses and possible effects on the community's occupation.

We found that when villagers were relocated, they often experienced changes in social vulnerabilities, as described in Finding #13. These changes in vulnerabilities were

positive, such as land ownership and a better education system, and negative, such as disruptions to occupations and increased economic strain. For example, in the villages we studied, most villagers were fishermen, whose occupations were disrupted when they were relocated farther from the water. These villagers are unable to spend as much time fishing as before the tsunami, therefore causing their income to decline, and making them more vulnerable to economic stresses. Additionally, many villagers experienced an increase in cost of living, as described in Finding #9, thus further increasing their vulnerabilities to economic stresses.

We recommend that if a community must be relocated, organizations should consider the social, cultural, and economic needs of the community. They should choose the location that best minimizes disruptions to residents' lives and livelihoods.

5.1.3 When NGOs and/or government agencies make decisions regarding the relocation or design of houses, they should consider the social demographics of the community, most importantly occupation, income, and family structure.

As described in Finding #14, we identified three important social demographics that influenced changes in social vulnerabilities brought about by the reconstruction effort. These three social demographics are: occupation, income, and family structure. In order to best take into account villagers' needs and wants and to minimize social vulnerabilities, we recommend that reconstruction organizations take into account these social demographics.

We found that in some cases, when communities were relocated, villagers' occupations suffered. In our case studies, we were told that many of the fishermen that were relocated were unable to fish as frequently as they did before the tsunami, which has greatly hurt their incomes, as described in Finding #9. With a change in occupation, incomes may suffer greatly, preventing residents and their families from purchasing goods that they may need to survive and thus increasing their social vulnerabilities to economic stresses.

When a person's occupation is disrupted, their social vulnerabilities are increased as they become susceptible to losing their main source of income. A loss of income can

have huge repercussions on people's lives, forcing them to alter their lifestyle by seeking alternate occupations or reducing their spending. In order to best incorporate occupational needs into the design of the houses, NGOs and/or government agencies should directly speak to the disaster affected people to first identify what the main occupations of the community are. Organizations can learn about the community's occupation and how this affects their housing needs by speaking directly to community members through interviews or focus groups. Also, background research should be done to learn more about the area's major occupations.

Along with occupation, we have also found that income is an important factor that may influence changes in vulnerabilities. A community's income may affect the amount of post-reconstruction work (whether it be repairs or additions) that they can perform on their house. We have found that when the materials and construction techniques used in the new houses were different than the villagers' pre-tsunami houses, new expenses arose due to the additional repairs needed to be made on the houses, as described in Finding #7. Also, we have found that when villagers were relocated, new expenses arose due to an increase in the cost of living, as described in Finding #9. With new economic strains, the affected people become burdened because they experience an increased vulnerability to economic stresses, forcing them to rely on new forms of income.

Reconstruction organizations should first identify the average income of the community by asking residents directly through interviews and focus groups. They should consider materials and construction techniques that will not cause excess economic strain on the affected people. This can be done through research into the various choices for housing materials and construction techniques and by performing a cost estimate of possible future repairs. If relocation is necessary, NGOs and/or government agencies should choose a location that does not greatly increase the cost of living for community members.

The final social demographic that we have identified as being important in influencing changes in social vulnerabilities is family structure, by which we mean family size and age demographics of families. We found that in the studied villages, elderly community members had specific needs. Elderly members of the family needed to live on the ground floor of the house because it was difficult for them to use the stairs,

as described in Finding #8. The houses in these communities were not designed for this because both bedrooms were located on the top floor. Many families had to add additions to their houses to allow elderly family members to sleep on the ground floor.

NGOs and/or government agencies performing reconstruction should gather information regarding the number of people and age brackets for each house. This can be done by speaking directly to community members through interviews or focus groups. The needs of each age group should also be identified through interviews with community members and background research. This information should be incorporated into the design of the house by making the house large enough for each family and by meeting the specific needs of various age groups.

5.1.4 Coordination among government agencies should be improved.

We have found that there was little to no coordination among the Thai government offices that participated in the reconstruction effort due perhaps to the magnitude of the disaster. As described in Finding #3, decisions regarding the reconstruction of specific villages were handled at the provincial level, while the designs for the houses and general planning was handled by central government. We have found that there was miscommunication between government officials at the provincial level and those in the central government. For instance, the Bureau of Architecture in the Ministry of Interior believes that villagers chose the designs for their houses, while the director of the Ranong province office told us that the Royal Thai Air Force chose the designs. By speaking to villagers in three villages reconstructed by the Thai government, we have learned that villagers did not have a choice for the design of their homes. The intention of Suchart Trisatayapan, the director of the Bureau of Architecture, was to allow the villagers to choose the design for their houses (out of four possible designs) in order to ensure that they were given a house that met their needs. However, this intention was probably lost as instructions were passed down a long chain of command.

When the necessity for post-disaster reconstruction arises in the future, we recommend that the Thai government improve communication between the central and provincial governments. To avoid any miscommunications, the reconstruction goals and processes should be clearly laid out and conveyed during the beginning phases of the

reconstruction. This will help ensure that the intentions of one government agency are understood and passed on to other government agencies. With improved communications and clearer objectives, the government-built houses may better prevent further increases in social vulnerabilities and better suit the needs of the affected people.

5.1.5 Coordination between government agencies and NGOs should be improved.

Additionally, we have found that there was no coordination between the government agencies and NGOs participating in the reconstruction effort, as described in Finding #4. Since the former Prime Minister refused international aid, government officials did not work with NGOs during the reconstruction effort because they felt that doing so would violate the Prime Minister's policies. Following the tsunami, NGOs had to contact local authorities, such as those in the provincial offices, to establish specific sites that they could reconstruct. (We are unsure exactly how the process worked for assigning NGOs to specific villages.) From our interviews, we have learned that no records of the reconstruction were kept within the central government and we are unsure if any were kept at the provincial level.

From a previous study it has been noted that in Ban Tub Nua and Ban Hat Sai Khao of the Ranong province, villagers should have been provided with village representatives from local NGOs that they could contact for questions or problems. However, most villagers did not know who their representative was or how to contact him/her (DeMasi et al., 2006). Both of these villages were reconstructed by the Thai government and therefore we hypothesize that the problem of villagers being unaware of their local representatives has resulted from a lack of coordination between Thai government agencies and local NGOs.

Past experience has demonstrated that those performing reconstruction following a disaster need to work together to plan, coordinate, and organize the effort (Walter, 2005, OECD, 1996). To ensure that the reconstruction effort is properly coordinated, it is recommended that there is a single coordinator to act as a liaison between all participating parties (Walter, 2005). Therefore, we recommend that in the event of a future reconstruction effort, the Thai government appoint a person or group of people

(depending on the size of the affected area) to act as the coordinator for the reconstruction effort. Having a coordinator will help ensure that central documents are kept of the NGOs that performed reconstruction and where they worked, which may be important for villagers, the government, or future interested parties to know. The coordinator will also be able to act as a liaison between different NGOs and government agencies, ensuring that all organizations work together to make the reconstruction effort run as smoothly as possible. Therefore, NGOs will not waste time performing logistical work because they will only need to contact the coordinator, rather than trying to contact local authorities at the provincial and possibly even village level.

5.2 Recommendations for Future Research

Because this was a small scale research project, future research is needed to fully understand how the reconstruction approaches used by organizations relate to the changes in social vulnerabilities villagers are experiencing. Working to complete this analysis will provide researchers and reconstruction organizations with a greater understanding of the social aspects that can influence the outcome of a reconstruction effort.

5.2.1 Researchers should continue gathering information regarding the reconstruction effort in other villages to determine if our findings can be generalized.

In order to determine if our findings can be generalized to accurately describe the post-tsunami reconstruction effort in Thailand, researchers should seek to gather additional information regarding the reconstruction approaches used by organizations and the changes in social vulnerabilities villagers are experiencing. Since this was a small-scale research study, we were not able to gather data from a wide range of organizations or villages. Future research should expand upon this study by gathering information regarding other organizations and other villages. Also, other social demographics that may have influenced changes in social vulnerabilities brought about by the reconstruction effort should be identified. To accomplish this, future studies should be expanded to include all six tsunami-affected provinces.

As additional research is gathered, the database created by this project should be continuously updated. The database is a working system that should be updated

constantly for other researchers and organizations to use to gather information. In this way, the findings from various researchers will be stored in a central location, allowing comparisons from different sets of data to be made.

5.2.2 Researchers should explore the relationships between organizations' efforts to restore livelihoods and changes in villagers' social vulnerabilities.

As described in Finding #6, we found that some organizations, such as Save Andaman, NATR, and USAID have helped to restore villagers' livelihoods by repairing boats for fishermen, providing villagers with revolving funds, establishing eco-tourism systems, and by providing education about alternative livelihoods. Since the focus of our project was the reconstruction of villagers' houses, we were not able to fully explore how the restoration of livelihoods has affected villagers' social vulnerabilities. We hypothesize that organizations that helped to restore livelihoods have decreased social vulnerabilities because they have restored villagers' occupations by helping fishermen to repair damaged boats and provided them with new means of income by offering alternative livelihoods. Also, we did not explore how well the activities of these organizations were integrated into the reconstruction process. We do not know if organizations that supported villagers' livelihoods coordinated their efforts with organizations that performed reconstruction.

Future researchers should gather information about the processes used by organizations to restore villagers' livelihoods. In order to understand exactly how this process has changed villagers' social vulnerabilities, relationships should be established between the restoration of livelihoods and the changes in social vulnerabilities. Additionally, researchers should seek to understand how well livelihood restoration and housing reconstruction were coordinated. With this information, recommendations can be made to improve the quality of livelihood restoration and to possibly suggest this practice to other organizations.

5.2.3 Researchers should further investigate the processes of coordination among government agencies used during the reconstruction effort.

We have found that throughout the reconstruction effort, there was little coordination between various government offices, as described in Finding #3. Government officials in the central government informed us that villagers had a choice in the design of their houses, while those at the provincial level told us that the Royal Thai Air Force chose the design. When we talked to villagers, they explained to us that they had no choice in the design of their houses. Through our research, we have found that there was some miscommunication between government officials at the national and provincial levels, although we have not been able to identify exactly why this occurred or how it affected the reconstruction process and the outcomes of the reconstruction.

Future researchers should seek to understand the reconstruction processes that produced the government built houses. In order to understand the complete process, they should focus on gathering information from the central and provincial governments and comparing this to information gathered from villagers. Once the process that occurred is understood, further recommendations can be made to government officials to improve the process in the event of a future reconstruction effort.

5.2.4 Researchers should assess the physical safety of the construction techniques and materials used in the houses to determine the dangers villagers face.

As described in our findings section, we found that some houses appeared to be poorly constructed or unsafe, as described in Finding #5. In some villages, we noticed problems resulting from poor construction, such as broken ceiling tiles and cracks in the walls and ceilings. In other villages we noticed more serious problems, such as un-reinforced second floors and asbestos roofs. If ignored, these problems could pose serious problems for villagers, creating increases in social and physical vulnerabilities. Problems resulting from poor construction may require villagers to perform additional repairs, which may be impossible for them given their income or knowledge of the structures and materials. The more serious problems could have severe long term effects

on villagers' lives. For example, the asbestos roofing could have health impacts on the villagers, especially the younger generations since they will be living in these houses for a long period of time.

Since we were not qualified to determine if the houses are really unsafe, researchers should perform physical assessments of the houses to determine the extent of the problem. Once this is done, further recommendations should be made both to villagers and organizations in order to address to the current situation, as well as to prevent the occurrence of future problems.

5.3 Summary

Based on our findings, we have identified recommendations for reconstruction organizations and for future research. The recommendations we offer to reconstruction organizations are intended to ensure that future reconstruction efforts produce houses that meet the needs and wants of the residents do not increase social vulnerabilities. It is important that organizations involve the community in the reconstruction process as much as possible. By involving the community, they will ensure that the houses suit the needs of the affected people and also that residents will be able to repair and modify their own houses in the future. If a community must be relocated to another area, organizations should choose the location with minimal affects on residents' livelihoods. Organizations should consider the social demographics of the community, most importantly occupational profile, income structure, and family structure. Finally, communication should be improved among government agencies and between NGOs and government agencies.

Since we were not able to perform an in-depth study of all tsunami-affected villages in Thailand, we also offer recommendations to future researchers to continue our work. We recommend that researchers continue our work, by visiting additional tsunami-affected villages, interviewing additional organizations, and adding to our database. We recommend that researchers seek to better understand the process that organizations used to restore villagers' livelihoods, as well as understand how this has affected changes in villagers' social vulnerabilities. We also recommend that researchers further investigate the processes by which the government designed and built the reconstructed houses.

Finally, we recommend that researchers assess the physical safety of the houses to determine the dangers that may be present.

6 Conclusion

By performing archival research and case studies in six tsunami-affected villages in Southern Thailand, we have found that when NGOs and government agencies use certain reconstruction practices, houses do not meet villagers' needs and wants and will cause an increase in social vulnerabilities. In many cases, when villagers were not involved in the reconstruction process, the houses did not suit their needs and they were more dependent on others for house repairs and modifications. We found that when villages were relocated, many villagers experienced increased vulnerabilities due to occupational shifts and new economic strains. Additionally, we have identified occupation, income, and family structure as being the important social demographics that influenced the changes in vulnerabilities that were created by the reconstruction effort.

From these findings, we offered recommendations to government agencies and NGOs to improve the outcomes of future reconstruction efforts by ensuring that the new structures meet residents' needs and do not further increase their social vulnerabilities. First, we recommend that government agencies and NGOs seek to involve the community in reconstruction to ensure that residents can modify and repair the new houses as needed, as well as ensuring that it best suits their needs. We also recommend that if a village must be relocated, government agencies and NGOs choose a location that has minimal impact on their lives and livelihoods and does not increase social vulnerabilities. Finally, we have identified three important social demographics that should be taken into consideration during the reconstruction process – occupation, income, and family structure.

The recommendations that we have offered to government agencies and NGOs performing reconstruction may be applied to any reconstruction effort, regardless of the country or type of natural disaster. The problems we have seen in our case study villages are not isolated incidents. They have been observed by other researchers studying post-tsunami reconstruction in other villages in Thailand. Also, many of the same problems have been seen during reconstruction efforts of past disasters throughout the world. The challenge for reconstruction organizations is to focus on providing communities with long-lasting solutions by minimizing future vulnerabilities and promoting livelihoods,

rather than focusing on short term needs. It is our hope that our findings and database will help to improve future reconstruction efforts and further organizations' contributions to humanity.

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APPENDIX A – Semi-structured Interview Questions for Organizations

1. What were your goals throughout this process?
    a. Do you believe that they were achieved?
        i. How did you achieve them?
2. Before beginning the reconstruction, did you have pre-set plans for the design of the houses?
    a. If so, how did you develop these plans?
3. Before beginning the reconstruction, did you have pre-set plans for the layout of the village?
    a. If so, how did you develop these plans?
4. If you didn't have pre-set plans, how did you decide upon the design, layout, and materials for the structures?
    a. Did the villagers provide any input on the design, layout, or materials?
        i. How did you get input from the villagers? With a focus group? Individual Interviews?
5. Were the villagers involved in the physical construction of the houses?
    a. If so, how were they involved?
6. What sort of materials did you construct with?
    a. Where did you obtain these materials?
    b. Are these materials familiar to the villagers?
7. Besides the basic needs of shelter, what were the characteristics of villagers' lives that were considered in the design/layout of these houses?
    a. Religion?
    b. Occupation?
    c. Ethnicity?
    d. Education?
    e. Economic status?
    f. Family structure?

APPENDIX B – Semi-Structured Village Interview Questions

1. Who rebuilt your house?
2. What do you like about your new house?
    a. What is your favorite aspect of your new house?
3. What do you dislike about your new house?
4. Is there anything that worries you about your new house?
    a. What problems do you see?
5. Do you feel that your new house supports your needs better or worse than your old house did?
    a. What needs do you feel are not adequately met?
6. Is your new house on the same land as your old house?
    a. If not, do you feel this is a problem?
        i. Why do you think it is a problem?
        ii. Do you know why the location was changed?
    b. Did you own the land your old house was built on?
    c. Do you own the land your new house is built on?
7. Were you asked about your needs so your new house would better suit your needs?
    a. If so, what needs were you asked about?
    b. Were you asked your opinion about the design of your house?
8. Did you or anyone in your household choose the design of your house?
9. Did you, or anyone in your household, assist with the construction of your new house?
10. To what extent do you feel that you will be able to fix, repair, and maintain your new house?
    a. Have you made any repairs to your house?
        i. Did you make them yourself or hire someone? If you hired someone, who was it?
    b. Do you know where to access materials to repair your house, if necessary?
        i. Would you be able to afford these materials?

11. Do you often contact outside agencies/people for repairs and maintenance?
    a. If yes, who do you contact?
    b. If not, would you contact someone if you had the resources to do so?
12. Is the layout of the village after the reconstruction different than before?
    a. If so, how did it change?
        i. How do you feel about the new layout?

APPENDIX C – Village Survey (English)

Questionnaire Questions:

1. Name: _____

2. How old are you? _____ Village: _____

3. How many people live in your home? _____

4. Who built your house?
   - ☐ I built it myself.
   - ☐ The Government.
   - ☐ Other relief organization. Name of organization _____

5. Was your family asked for its opinion on the design of your new house?
   - ☐ Yes
   - ☐ No
   - ☐ Unsure

6. Were you or your family presented with a choice of designs for your new house?
   - ☐ Yes
   - ☐ No
   - ☐ Unsure

7. Did you or someone in your family help construct your house?
   - ☐ Yes
   - ☐ No
   - ☐ Unsure

8. Do you feel your house has sufficient space for your family's living needs?
   - ☐ Yes
   - ☐ No

9. Is your new house larger, smaller, or about the same size as your old house?
   - ☐ Larger.
   - ☐ Smaller.
   - ☐ About the same size.

10. Has your family added any additions or made any major changes to your house since it was rebuilt?
    - ☐ Yes
    - ☐ No

11. Are you satisfied with your new house, or are you unhappy with the outcome.

- ☐ I am satisfied with my new house.
- ☐ I am unhappy with the outcome.

12. Do you, or someone in your family, feel you know enough about the structure of your new house and the materials it is made out of, to make repairs in the future?
    - ☐ Yes
    - ☐ No

13. Do you feel you have the ability to obtain the materials necessary to make repairs on your house?
    - ☐ Yes, I feel I can obtain the material necessary.
    - ☐ No, I do not feel I can.

APPENDIX D – Village Survey (Thai)

แบบสอบถามโครงการฟื้นฟูบ้านเรือนหลังเหตุการณ์คลื่นสึนามิ

1. ชื่อ-นามสกุล……..
2. อายุ……ปี สถานที่……
3. จำนวนคนในครอบครัว……คน
4. ใครสร้างบ้านหลังใหม่ให้ท่าน
   - สร้างเอง
   - องค์กรของรัฐ
   - หน่วยงานหรือองค์กรอื่นๆ ระบุชื่อ……..
5. ท่านได้ปรึกษาสมาชิกในครอบครัวของท่านในการเสนอความคิดเห็นในการออกแบบบ้านหลังใหม่หรือไม่
   - ใช่
   - ไม่ใช่
   - ไม่แน่ใจ
6. ท่านหรือครอบครัวของท่านได้มีโอกาสเลือกแบบบ้านหลังใหม่หรือไม่
   - ใช่
   - ไม่ใช่
   - ไม่แน่ใจ
7. ท่านหรือครอบครัวของท่านได้ช่วยสร้างบ้านหลังใหม่หรือไม่
   - ใช่
   - ไม่ใช่
   - ไม่แน่ใจ
8. บ้านหลังใหม่ของท่านมีพื้นที่เพียงพอสำหรับครอบครัวของท่านหรือไม่
   - เพียงพอ
   - ไม่เพียงพอ
9. บ้านหลังใหม่ของท่านมีพื้นที่เท่าใดเมื่อเทียบกับหลังเก่า
   - ใหญ่กว่า
   - เล็กกว่า
   - เท่าๆกัน
10. ครอบครัวของท่านได้ต่อเติมบ้านเพิ่มเติมหรือไม่หลังจากที่สร้างบ้านหลังใหม่เสร็จ
    - ต่อเติม
    - ไม่ต่อเติม
11. ท่านรู้สึกอย่างไรกับบ้านหลังใหม่
    - พอใจ
    - ไม่เพอใจ
12. ท่านหรือบุคคลในครอบครัวมีความรู้เพียงพอเกี่ยวกับโครงสร้างของบ้าน รวมทั้งวัสดุที่ใช้สร้างบ้านหลังใหม่หรือไม่ หากในอนาคตจำเป็นต้องซ่อมบ้าน
    - มี
    - ไม่มี
13. ท่านสามารถหาวัสดุที่จำเป็นสำหรับซ่อมบ้านของท่านได้หรือไม่
    - สามารถหาได้
    - ไม่สามารถหาได้

APPENDIX E – Table of Organizations

ORGANIZATION	PROVINCE	DISTRICT (AMPHOE)	SUB-DISTRICT (TAMBON)	VILLAGE	NUMBER OF HOUSES	DATE OF WORK
4Kali	Phang Nga	Takua Pa	Koh Khor Kao	Nok Nah - Village 2	3	Feb 2005 - May 2005
			Bang Muang	Bang Muang - Village 4	41	Feb 2005 - April 2005
			Khuk Khak	Bang Niang - Village 5	2	March 2005 - Jan 2005
Adventist Development and Relief Agency (ADRA)	Ranong	Suk Samran	Naka	Bang Gluay - Village 3	4	Aug 2005 - Oct 2005
				Na Pru - Village 2	7	Aug 2005 - Oct 2005
	Phang Nga	Takua Pa	Bang Muang	Bang Mor - Village 3	4	Sept 2005 - Nov 2005
Beluga School for Life	Phang Nga	Thai Muang	Thung Maprow	Nah Nai -Village 4	20	Jan 2005 - present
Catholic Mission of Surat Thani	Phang Nga	Khuraburi	UNKNOWN	Chum Chon Tap-Parat	42	unknown
Community Organizations Development Institute (CODI)	Phang Nga	Takua Pa	Khuk Khak	Thung Wah - Village 5	71	Dec 2004 - Oct 2005
			Bang Muang	Nam Khem - Village 2	103	Jan 2006 - unknown
		Khuraburi	Khura	Pak Triam - Village 4	23	unknown
	Ranong	Suk Samran	Kom Puan	Talay Nok - Village 1	3	Dec 2004 - Feb 2005
		Muang	Ngao	Had Sai Dum - Village 5	29	unknown
	Phuket	Thalang	Mai Kao	Ta Chatchai - Village 5	51	March 2005 - June 2005
		Muang	Radsada	Koh Si Leh - Village 1	109	unknown
		Kathu	Pathong	Klong Bak Bang Community	16	unknown
	Krabi	Koh Lan Dah	Koh Lan Dah Yai	Hua Laem - Village 1	36	unknown
		Muang	Ao Nang	Koh Phi Phi - Village 7	22	unknown
Farang Jai Dee	Phang Nga	Khuraburi	Mae Nang Kao	Ban Nai Tiuew - Village 7	32	unknown
Habitat for Humanity	Phang Nga	Takua Pa	Khuk Khak	Bang La-Own - Village 7	36	Mar 2005 - Nov 2005

			Bang Nai Si	Pru Tiow - Village 7	60	Apr 2005 - Oct 2005
		Thai Muang	Thung Maprow	Koh Nok - Village 2	65	Oct 2005 - Oct 2006
			Laem Pi	Laem Pi - Village 4	15	Jan 2006 - May 2006
			Laem Kaen	Tah Din Dang - Village 4	28	Mar 2006 - Oct 2006
			Nah Duey	Yai Nin - Village 3	unknown	Oct 2006 - Aug 2007
				Bang Klee - Village 8	unknown	Oct 2006 - Aug 2007
				Nah Fek - Village 9	unknown	Oct 2006 - Aug 2007
	Phuket	Thalang	Mai Khao	Thachatchai - Village 5	91	Feb 2005 - Feb 2006
			Tep Kah Sat Dree	Khok Sae - Village 1	8	Jul 2006 - Oct 2006
		Muang	Rat Sah Dah	Koh Si Leh - Village 1	36	Apr 2006 - Oct 2006
	Ranong	Suk Sam Ran	UNKNOWN	UNKNOWN	79	Mar 2006 - Sep 2006
			Kam puan	Talay Nok - Village 1	unknown	Oct 2006 - Aug 2007
				Nua - Village 2	unknown	Oct 2006 - Aug 2007
				Kam puan - Village 3	unknown	Oct 2006 - Aug 2007
				Phu Khao Tong - Village 4	unknown	Oct 2006 - Aug 2007
				Suk Sam Ran - Village 5	unknown	Oct 2006 - Aug 2007
				Don Gloy - Village 6	unknown	Oct 2006 - Aug 2007
				Had Sai Kao - Village 7	unknown	Oct 2006 - Aug 2007
	Krabi	Ao Luk	Laem Sak	Hin Kao - Village 1	unknown	Nov 2006 - Aug 2007
				Ao Nam - Village 2	unknown	Nov 2006 - Aug 2007
				Laem Sak - Village 3	unknown	Nov 2006 - Aug 2007
				Samilah - Village 4	unknown	Nov 2006 - Aug 2007

				Klong Rad - Village 5	unknown	Nov 2006 - Aug 2007
				Nai Sai - Village 6	unknown	Nov 2006 - Aug 2007
Loung Marc	Phang Nga	Takua Pa	Bang Muang	Bang Sak Dai - Village 7	16	Jul 2005 - Sep 2006
				Bang Muang - Village 4	1	Aug 2006 - Aug 2006
		Khuraburi	UNKNOWN	UNKNOWN	1	Apr 2005 - Jun 2005
		Thai Muang	Thai Muang	Tah Saw - Village 5	1	Apr 2005 - Jun 2005
			Laem Pi	Laem Pi - Village 4	1	Feb 2005 - Sep 2006
Malteser International	Phang Nga	Takua Pa	Bang Muang	Nam Khem - Village 2	59	Jun 2005 - Nov 2006
				Tap Tawan - Village 7	31	unknown - Jul 2005
		Takua Thung	Khok Kloi	Talat Kok Kloi - Village 1	1	Apr 2005 - Aug 2006
	Trang	Kan Tang	Koh Li Bong	Koh Muk - Village 2	148	Jun 2006 - Jun 2007
Operation Blessing Thai	Krabi	Nua Klong	Koh Sri Boya	Koh Jum - Village 3	6	May 2005 - Jan 2006
Phuket Tsunami Recovery Fund	Phuket	Thalang	Choeng TaLay	Bang Tao - Village 2	104	Jan 2005 - July 2005
		Kathu	UNKNOWN	Kamala Village	6	March 2005 - June 2005
Rotary Club Patong Beach	Phang Nga	Khuraburi	Khura	Pak Triam - Village 9	23	unknown - Sept 2005
Rotary Club of Phang Nga	Phang Nga	Takua Pa	Bang Nai Si	Pru Tiow - Village 7	80	Dec 2004 - Dec 2005
		Thai Muang	Nah Duey	Nai Rai - Village 7	60	Dec 2004 - March 2005
	Krabi	Nua Klong	Koh Sri Boya	Koh Jum - Village 3	20	Oct 2005 - May 2006
Sahathai Lutheren Takua Pa	Phang Nga	Takua Pa	Bang Muang	Nam Khem - Village 2	11	June 2005 - June 2006
			Bang Nai Si	Pru Tiow - Village 7	1	April 2006 - June 2006
Save Andaman	Phang Nga	Takua Pa	Koh Kor Khao	Ban Nog Na - Village 2	4	Jan 2005 - Jan 2006
			Bang Muang	Tab Tawan - Village 7	47	Jan 2005 - Jan 2006

				Laem Pom - Village 2	33	Jan 2005 - Jan 2006
				Nam Khem - Village 2	15	Jan 2005 - Jan 2006
		Khuraburi	Koh Pratong	Ban Trung Dap - Village 1	16	Jan 2005 - Jan 2006
			Nah Duey	Nai Rai - Village 7	35	Jan 2005 - Jan 2006
	Ranong	Muang	Bak Nam	Koh Lao - Village 6	20	Jan 2005 - Jan 2006
				Koh Sin Hai - Village 4	11	Jan 2005 - Jan 2006
	Phuket	Muang	Rat Sah Dah	Khok Sai - Village 1	112	Jan 2005 - Jan 2006
			Koh Kaew	Sa Pam - Village 1	40	Jan 2005 - Jan 2006
	Trang	Si Gao	Khao Mai Kaew	Leam Sai - Village 3	2	Jan 2005 - Jan 2006
		Had Sam Ran	Dah Sae	Dah Sae - Village 4	1	Jan 2005 - Jan 2006
		Kan Tang	Bang Sak	Kuan Dung Gu - Village 3	8	Jan 2005 - Jan 2006
				Nam Raab - Village 4	1	Jan 2005 - Jan 2006
	Krabi	Koh Lanta	Klong Yang	Sang Gah Ouh - Village 7	32	Jan 2005 - Jan 2006
			Koh Lanta Yai	Sri Ra Ya - Village 2	11	Jan 2005 - Jan 2006
	Satun	La Ngu	Bak Nam	Bow Jed Luuk - Village 1	4	Jan 2005 - Jan 2006
		Muang	Koh Sah Rai	Dan Yong Umah - Village 1	1	Jan 2005 - Jan 2006
				Bah Gan Yai - Village 2	2	Jan 2005 - Jan 2006
				Dan Yong Gling - Village 3	1	Jan 2005 - Jan 2006
				Ya Ra Dod Nui - Village 4	4	Jan 2005 - Jan 2006
				Ya Ra Dod Yai - Village 5	4	Jan 2005 - Jan 2006
Secours Populaire Française	Phang Nga	Khuraburi	UNKNOWN	Ban Tarnkirin	unknown	unknown
Social Pastoral Center	Phang Nga	Khuraburi	Mae Nang Kao	Bang Dad - Village 7	42	May 2005 - Nov 2006

			Bang Wan	Bang Wan - Village 1	unknown	May 2005 - March 2006
		Takua Pa	Bang Muang	Bang Sak Dai - Village 8	16	May 2005 - March 2006
				Nam Khem - Village 2	unknown	May 2005 - March 2006
			Khuk Khak	Bang Niang - Village 5	33	May 2005 - March 2006
			Koh Kor Khao	UNKNOWN	unknown	May 2005 - March 2006
			Thung Maprow	Kanim - Village 7	unknown	May 2005 - March 2006
				UNKNOWN	unknown	May 2005 - March 2006
Swiss Agency for Development and Cooperation (SDC)	Phang Nga	Takua Pa	Koh Khor Khao	Muang Mai - Village 1	8	Jan 2006 - Sept 2006
		Khuraburi	Koh Pratong	Tah Pah Yoi - Village 2	16	Aug 2005 - March 2006
Thai Government	Ranong	Kapoe	Muang Gluang	Aow Kuey	42	unknown
		La Un	Nai Wong Nua	Tub Nua	69	unknown
		Suk Samran	Kom Puan	Talay Nok	22	unknown
				Had Sai Dum	52	unknown
	Phang Nga	Khuraburi	UNKNOWN	Ban Chai Pattana	130	unknown
		Takua Pa	Bang Muang	Many	453	unknown
				Bang Lud	150	unknown
	Trang	Kan Trang	Kho Li Bong	Koh Muak	25	unknown
				Mod Dah Noi	5	unknown
				UNKNOWN	2	unknown
		Pa Lian	Ko Su Korn	UNKNOWN	1	unknown
	Phuket	Muang Phuket	Chalong	Bah Lai	10	unknown
			Rad Sah Dah	Laem Tuk Kae	24	unknown
			Rawai	Koh Loan	5	unknown
		Thalang	Choeng Talay	Had Surin	16	unknown
			Mai Kao	Tah Chad Chai	36	unknown
			Sah Loo	Sah Loo	1	unknown
	Krabi	Koh Lanta	Koh Lanta Yai	Hua Laem	80	unknown
		Muang Krabi	Ao Nang	Koh Phi Phi	278	unknown

Tsunami Volunteer Center (TVC)	Phang Nga	Takua Pa	Bang Muang	Nam Khem - Village 2	50	unknown
				Tap Tawan - Village 7	100	unknown
				Bang Sak Dai -Village 7	51	unknown
			Koh Kor Khao	UNKNOWN	41	unknown
			Khuk Khak	Khao Lak - Village 7	30	unknown
We Love Thailand	Phang Nga	Thai Muang	Nah Duey	Bang Duey Dai - Village 7	unknown	Jan 2005 - Dec 2006
			Thung Maprow	Koh Nok - Village 2	unknown	Jan 2005 - Dec 2006
			Lom Kaen	Lom Ru - Village 1	unknown	Jan 2005 - Dec 2006
			Thai Muang	Baan Theptharo	unknown	Jan 2005 - Dec 2006
Willi Hilft e.v. (Willi & Morgan)	Phang Nga	Takua Pa	Bang Muang	Tap Tawan - Village 7	41	Dec 2004 - April 2006
				Ban Bon Rai - Village 8	7	March 2005 - April 2006
World Concern	Phang Nga	Thai Muang	Lom Kaen	Tah Din Dang - Village 4	unknown	April 2005 - present
			Thai Muang	Lom Pi - Village 6	unknown	April 2005 - present
			Thung Maprow	Thung Maprow - Village 1	unknown	April 2005 - present
				Koh Nok - Village 2	unknown	April 2005 - present
		Takua Pa	Khuk Khak	Thung Wah - Village 5	unknown	April 2005 - present
			Bang Nai Si	Pru Tiow - Village 7	unknown	April 2005 - present
				Bang Nai Sang - Village 5	unknown	April 2005 - present
		Khuraburi	Bang Wan	Thung La Ong - Village 4	unknown	April 2005 - present
World Vision	Phang Nga	Thai Muang	Nah Duey	Nai Rai - Village 7	7	ongoing
			Lom Kaen	Tab Lamu - Village 5	22	ongoing
		Takua Pa	Bang Muang	Nam Khem - Village 2	27	ongoing
	Krabi	Muang Krabi	Ao Nang	Koh Phi Phi - Village 7	160	ongoing
			UNKNOWN	UNKNOWN	17	ongoing
		Koh Lanta	Koh Lanta Yai	Sang Gah Ouh - Village 7	91	ongoing