

Resilient Disaster Recovery:

A Critical Assessment of the 2006 Yogyakarta, Indonesia
Earthquake using a Vulnerability, Resilience and Sustainable
Livelihoods Framework

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Since the 2004 Indian Ocean tsunami devastated coastal areas of several countries in South East Asia, there has been renewed interest in disaster recovery operations. Although governments and aid organizations have increasingly focused on improving living conditions and reducing vulnerability to future disaster events during the recovery period, there has been limited understanding of what effective disaster recovery entails, and a lack of empirical assessments of longer-term recovery initiatives. Researchers, governments and aid organizations alike have increasingly identified the need for a systematic, independent, and replicable framework and approach for monitoring, evaluating and measuring the longer-term relief and recovery operations of major disaster events.

Within this context, the research contends that a conceptualization of effective disaster recovery, referred to as ‘resilient disaster recovery’, should be built upon the holistic concepts of vulnerability, resilience and sustainable livelihoods. Using the resilient disaster recovery framework, the research aimed to develop an evaluative strategy to holistically and critically assess disaster recovery efforts. Using a case study of the 2006 Yogyakarta, Indonesia earthquake event, the research examined one long-term recovery effort in order to develop and test the usefulness and applicability of the resilient disaster recovery conceptualization and assessment framework. The research results further contributed to disaster recovery knowledge and academic literature through a refined conceptualization of resilient disaster recovery and further understanding of recovery as a process.

The research used qualitative research approaches to examine the opinions and experiences of impacted individuals, households, and communities, as well as key government, academic and humanitarian stakeholders, in order to understand their perceptions of the long-term recovery process. Using the resilient disaster recovery approach, the research found that the recovery programming after the 2006 Yogyakarta earthquake contributed to reductions in visible manifestations of vulnerability, although the root causes of vulnerability were not addressed, and many villagers suffer from ongoing lack of access to assets and resources. While some aspects of resilience were improved, particularly through earthquake-resistant housing structures, resilience in other forms remained the same or decreased. Furthermore, livelihood initiatives did not appear to be successful due to a lack of a holistic approach that matched the skill and capital levels of impacted populations.

Using the evidence from the 2006 Yogyakarta recovery effort, the research furthered knowledge and understanding of disaster recovery as a complex and highly dynamic process. The roles of a variety of actors and stakeholders were explored, particularly highlighting the role of civil society and the private sector in facilitating response and recovery. Furthermore, issues of conflict, the context and characteristics of place and scale, and the impact of disasters on income equality were explored. Through this research, an improved understanding of disaster resilient recovery and long-term recovery processes has been highlighted in order to facilitate improved and resilient recovery for future disaster events.

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1.0 INTRODUCTION

The purpose of this study is to explore the longer-term post-disaster recovery period with the aim to contribute conceptually to the disaster recovery literature, examine appropriate methods for evaluating long-term recovery, as well as provide an empirical assessment of one recovery effort. In order to introduce the topic of disasters and recovery, the introductory chapter begins with an overview of the key terms used in this research, followed by an overview of the social and economic impacts of disaster events. This overview will highlight the importance of the following research in order to contribute to an understanding of how effective disaster risk reduction initiatives can be implemented during the recovery period in order to reduce vulnerability to future events. Subsequently, the research objectives and questions are outlined in order to provide a foundation for the dissertation. To conclude, an overview of the dissertation structure is provided, summarizing the key components of each chapter.

1.1 Background and Research Justification

A disaster event can be defined as a “serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources” (UNISDR, 2009). Disaster events can originate from a variety of sources, including natural, technological and civil/political events arising from social unrest and conflict (Coppola, 2007). The focus of this dissertation will be on natural disasters,¹ which are defined as “events that originate in, and are transmitted through, the environment” (Smith & Petley, 2009, p. 9). Although these disaster events originate from a natural trigger, it is increasingly recognized that human activities and development processes play a central role in creating vulnerability to these natural hazards (Blaikie, Cannon, Davis, & Wisner, 1994; Pelling, 2003; Wisner, Blaikie, Cannon, & Davis, 2004).

A disaster event is the realization of a particular hazard: a natural hazard can be defined as “any natural process that threatens human life or property. The process itself is not a hazard; rather, it becomes a hazard only when threatening human interests” (Keller, Blodgett, & Clague, 2008, p. 6).

¹ Although the research focuses on natural disasters, it is increasingly recognized that there is difficulty in distinguishing between natural and other hazard sources, including technological and social/political hazards of conflict. The interconnections between natural processes and human actions are so intertwined that it can be difficult to distinguish between natural and human-influenced processes (i.e. large rainfall contributing to a river dam failure and resulting flood; earthquake causing damages to buildings, etc.) (Pelling, 2003; Smith & Petley, 2009).

The degree of risk represents the likelihood that a natural hazard of a certain magnitude will occur, in combination with the expected levels of damages and impacts (Hyndman, Hyndman, & Catto, 2009). In this sense, a natural phenomenon becomes a hazard when it threatens human populations and a disaster when the hazard interacts with human activities and structures, resulting in significant impacts. Thus, the disaster event represents an intersection between environmental/ecological conditions and the social/developmental processes that influence the vulnerability of people.

Disaster events are complex, multi-dimensional phenomena, with a wide range of human, socio-economic, cultural, political, and physical impacts (El-Masri & Tipple, 1997). While the disaster event itself presents an immediate shock to impacted populations, the ramifications of disaster events tend to be ongoing:

Exposure to disaster impact is only the opening salvo. As the disaster unfolds, and far into the aftermath, the affected populations grapple with loss and change, consequences that persevere long after the risk for physical harm has dissipated. This trilogy of forces - exposure to hazard, massive personal and societal loss, and profound and enduring life change - characterize the nature of disaster (Shultz, Espinel, Galea, & Reissman, 2006, p. 69)

Although natural hazards have been a risk for human communities for centuries, the number of disaster events and their associated impacts has been increasing, particularly since the 1960s (Abramovitz, 2001; Coppola, 2007; UNDP, 2004). For example, the number of disaster events occurring in the 1990s was over four times the number of disaster events recorded in the 1950s (Smith & Petley, 2009). As well, during the ten-year period from 1992 – 2001, the losses associated with natural disasters averaged US\$65 billion per year, which represents a seven-fold increase since the 1960's (Freeman, Keen, & Mani, 2003). Munich RE estimates that by the year 2050, the costs associated with disaster events could exceed US\$300 billion per year (UNISDR, 2002). In many cases, these loss estimates only incorporate property damages and do not include the secondary impacts of livelihood disruption, reduced productivity or psychological trauma (Keller, Blodgett, & Clague, 2008).

While these increasing rates could partly be attributed to improved quality of disaster reporting, the rising number and costs associated with natural disasters has been attributed to a number of factors, including precarious development practices, lack of infrastructure to handle hazardous events, development locations in high-risk sites, increased urbanization, and continuing levels of poverty

(El-Masri & Tipple, 1997; Smith & Petley, 2009). Within the context of climate change and increased pressure on, and conflict over, natural resources, the number of hazards is expected to continue to increase (Abramovitz, 2001; Bogardi, et al., 2005). The rising human, social, and economic costs of disaster events, along with the projected increases in the number of hazards, indicates that further understanding of the role of vulnerability reduction and adaptation capacities is required in order to determine how to reduce the risks of future disaster events occurring (Hyndman, Hyndman, & Catto, 2009).

In the event a disaster does occur, governance capacity and hazard prevention measures in many countries, particularly less developed ones, are either not in place, or are unable to handle the magnitude of the event. In these instances, relief and recovery operations begin, often with the stated intention of returning the community to pre-disaster norms. Yet many have acknowledged that returning communities and households to pre-disaster norms leaves them in a position of vulnerability to future hazards (Birkmann & Fernando, 2008; McEntire, 1999; McEntire, Fuller, Johnston, & Weber, 2002; Mileti, 1999; Wisner, et al., 2004). Recently, researchers, humanitarian and government agencies have recognized the importance of reducing vulnerability to future disaster events as well as incorporating preparedness and mitigation initiatives as part of the post-disaster recovery process.

A vulnerability-reduction approach to disaster recovery was increasingly recognized after the 2004 Indian Ocean tsunami that devastated many communities in South East Asia, particularly those in coastal areas of Indonesia, India, Sri Lanka and Thailand. The overwhelming international response to the tsunami event led to increased interest in disaster recovery operations, resulting in a newly popularized approach to recovery termed ‘build back better’ (Kennedy, Ashmore, Babister, & Kelman, 2008; Lloyd-Jones, 2006). The ‘build back better’ approach is derived from vulnerability research and the theory that a ‘window of opportunity’ for disaster risk reduction and improved re-development is created during the post-disaster recovery period. During this period, local citizens may have increased awareness of disaster risks and place pressure on governments and organizations to use reconstruction funds to remedy the weaknesses in developmental policies, infrastructure and institutional arrangements (Christopolos, 2006; Clinton, 2006; UNISDR, 2005).

It is within this context of renewed interest in disaster recovery operations that the importance of the research is situated. Although many government institutions and aid organizations have adopted the term ‘building back better’ to define their reconstruction and recovery activities,

defining what effective disaster recovery encompasses has been difficult. In many cases, the implicit definition of effective recovery programmes has focused on the speed of recovery, particularly building reconstruction (Kennedy, et al., 2008; Lizarralde, Johnson, & Davidson, 2010); the effectiveness of funding distribution (MacRae & Hodgkin, 2011); levels of community participation in the recovery process (Hidellage & Usoof, 2010); increased coordination and collaboration between various government and humanitarian organizations (Clinton, 2006; Maret & Amdal, 2010); as well as increased focus on livelihoods and economic recovery (Clinton, 2006; Mileti, 1999). In many of these conceptualizations, the definition of effective recovery is either: (1) one-dimensional, highlighting one or two aspects of recovery; (2) focused only on the initial process of implementing recovery as opposed to recovery outcomes, or; (3) emphasizes the behavior of humanitarian organizations as opposed to the process and outcomes of recovery for impacted communities.

Alexander (2000) argues the concept of effective disaster recovery must be operationalized under a holistic framework that offers a comprehensive vision of the future. While a comprehensive framework is lacking, there has been some attempts to explore different understandings of 'building back better', including Clinton's (2006) 10 key propositions for disaster recovery, as well as Kennedy, et al.'s (2008) exploration of the 'building back better' concept as being primarily 'safer'. While Clinton's (2006) 10 key propositions offer some insight into what effective recovery might achieve, the focus remains on strategies for implementing recovery operations from an organizational perspective, such as increasing accountability and reducing competition between aid agencies. Similarly, although Kennedy, et al. (2008) provide a conceptualization of recovery focused on safety, this approach has a tendency to focus on building reconstruction with limited emphasis on providing a holistic and comprehensive understanding of what effective disaster recovery entails for different stakeholders.

Not only has there been a limited understanding of what effective disaster recovery entails, there has also been a lack of empirical assessments of longer-term disaster recovery initiatives (Edgington, 2010). In many cases, evaluations of recovery efforts focus on specific sectors or programs and there is a lack of information regarding how recovery continues after humanitarian and government organizations finalize their programs and leave the area. While the difficulties and methodological issues of holistically assessing longer-term recovery have been highlighted (Brown, et al., 2008; Cuny, 1983; Masten & Obradovic, 2008), there is still a need to engage in

comprehensive evaluations of long-term disaster recovery efforts. These assessments will provide valuable information to support the effective implementation of disaster risk reduction efforts during recovery periods in order to reduce vulnerability to future disaster events.

Using the preceding as a base, this research contends that a conceptualization of effective disaster recovery, hereafter referred to as ‘resilient disaster recovery’, should be built upon the holistic concepts of vulnerability, resilience and sustainable livelihoods. While each of these concepts has been explored individually and will be discussed in further detail in chapter two, this research integrates them into a conceptualization of resilient disaster recovery (RDR) that can be used as a framework to guide empirical assessments of post-disaster recovery operations. The interpretation of resilient disaster recovery:

- 1) Is rooted in the literature;
- 2) Examines recovery from a variety of scales;
- 3) Focuses on the root causes and structural processes that lead to conditions of vulnerability;
- 4) Emphasizes improving the everyday living conditions of impacted populations;
- 5) Highlights the role of agency, local capacities and resiliencies in reducing risk to future disaster events, and;
- 6) Is based on empirical observation and field studies.

Using a holistic approach to disaster recovery provides an opportunity to contribute to disaster literature through an understanding of the in-depth processes occurring during the recovery period itself. This also presents an opportunity to provide further information and lessons learned in order to facilitate improvements in recovery programming and contribute to increased resilience in disaster-impacted communities. Thus, the research seeks to fill three gaps in the literature: 1) the development of a holistic conceptualization of resilient disaster recovery; 2) empirically testing resilient disaster recovery as an evaluation framework in a post-disaster setting, and; 3) providing an empirical assessment of a long-term recovery effort.

1.2 Research Objectives

The following dissertation examines the perceptions and opinions of impacted individuals, households and communities, as well as key stakeholders, after the 2006 Yogyakarta, Indonesia earthquake disaster in order to understand their perceptions of the long-term recovery process.

Specifically, the research seeks to contribute to disaster recovery literature through conceptualizing resilient disaster recovery and through an understanding of the process of recovery. Furthermore, the research seeks to provide an understanding of how the concepts of vulnerability, resilience and sustainable livelihoods are useful for analyzing and evaluating long-term disaster recovery efforts.

1.2.1 Problem Statement

Although large amounts of money have been spent to rebuild after disaster events, there is rarely any systematic and holistic examination of whether these expenditures achieve the intended goal of rebuilding communities in a ‘disaster resilient’ form (Labadie, 2008). Similarly, although vulnerability, resilience and sustainable livelihoods have been increasingly recognized in the hazards literature, there is limited integration of the three concepts in order to provide a framework for holistically evaluating disaster recovery efforts.

1.2.2 Research Objectives

The research has set out the following objectives:

- To contribute to disaster recovery knowledge and academic literature through a conceptualization of resilient disaster recovery and further understanding of disaster recovery as a process;
- To develop and test the usefulness and applicability of a combined sustainable livelihoods, resilience and vulnerability framework for evaluating disaster recovery;
- To provide a holistic and critical analysis of one disaster recovery effort using concepts of vulnerability, resilience and sustainable livelihoods as a framework.

1.2.3 Research Questions

Based on the above objectives, this research will attempt to address four distinct research questions:

- 1) Using the integrated concepts of vulnerability, resilience and sustainable livelihoods, termed the Resilient Disaster Recovery Assessment Framework (RDR-AF), did the recovery effort from the 2006 Yogyakarta earthquake effectively ‘build back better’?
- 2) Does the RDR-AF provide an appropriate and effective method for evaluating and assessing disaster recovery?

- 3) In what ways does the 2006 Yogyakarta earthquake recovery experience inform and contribute to disaster recovery theory and literature?
- 4) Based on the empirical evidence, how can the conceptualization of Resilient Disaster Recovery (RDR) be refined in order to provide an appropriate understanding of effective disaster recovery as a process?

1.3 Dissertation Organization

This dissertation is organized into eight chapters, including this introductory chapter. The introductory chapter has outlined some of the key definitions regarding hazards, risk and disasters, as well as an overview of the context of hazards research. Furthermore, the chapter highlighted the importance of recovery research in the context of increasing costs and expected frequency of disaster events. The chapter also outlined the key research objectives and research questions and provided a brief justification of the research.

The second chapter outlines the background literature that is relevant for understanding the variables and factors that influence disaster events and disaster recovery, as well as providing a foundation for understanding the conceptual framework used for this research. The literature review highlights the current knowledge regarding disaster recovery, as well as identifying the key gaps that the research seeks to address. Concepts of vulnerability, resilience and sustainable livelihoods are defined and modeled in order to provide a basis for the post-disaster conceptual framework outlined in chapter three.

Chapter three outlines the methodological process of conducting the research, including the preliminary research framework and how the concepts of vulnerability and resilience are organized under the sustainable livelihoods capitals framework. The various data collection methods are delineated, including an overview of why qualitative research methods were selected in order to meet the research objectives. Next, a discussion of the data collection and analysis methods, as well as how the different data sources were triangulated and data sources cross-checked against each other is included. Finally, an overview of the challenges and limitations of conducting the research in a foreign country and language is provided. The strategies that were used to try to mitigate these challenges and limitations are highlighted before moving onto a discussion of the case study site.

Chapter four provides an overview of the 2006 Yogyakarta earthquake event used as the case study for this research. The chapter begins by providing an overview of the history of Indonesia as well as the hazards and legal framework for preparing and responding to disaster events. This background information will be useful for understanding the context of the recovery operations after the earthquake in Yogyakarta as well as how these historical circumstances have contributed to conditions of vulnerability and marginalization to be discussed in later chapters. Consequently, an overview of the damages and destruction caused by the earthquake event is provided, as well as a summary of the recovery effort as implemented by the Indonesian government, a variety of humanitarian agencies organized under the UN cluster system, and the Java Reconstruction Fund. To conclude, an overview of the pre-existing conditions in the area that contributed to an effective recovery effort are outlined, providing a preliminary assessment of the recovery effort as viewed from the perspective of reconstruction and recovery organizations.

Chapter five continues to provide background information regarding the individual villages selected for inclusion in the research. This chapter provides background information on the living conditions of affected populations in Yogyakarta and Central Java provinces, including an overview of the economic and living conditions, urban/rural characteristics, governance structure, as well as cultural and religious factors that are important for understanding the long-term recovery process. The process for selecting village sites is then outlined, followed by a brief overview of the conditions, characteristics and recovery experiences of each of the five village sites. The purpose of this section is to provide the reader with an understanding of the different experiences of each village. This section also provides an opportunity to disseminate the information villagers and village leaders felt was important to share with outsiders.

The results chapter provides a holistic overview of the long-term recovery effort after the 2006 Yogyakarta earthquake event. The vulnerabilities, resiliencies and livelihood capacities are outlined, including a discussion of how these processes were impacted by the earthquake event as well as the subsequent recovery effort. Using the sustainable livelihoods framework to organize the data, the various vulnerabilities and resiliencies associated with human, social, physical, natural, financial, political, and cultural capitals are reviewed. This provides an overview of the aspects of recovery that contributed to increased resilience and capacity to cope with future hazards, as well as the vulnerabilities that were both perpetuated or increased due to the disaster and recovery process. Through an analysis of the conditions and responses of the affected villages, as well as

responses from key stakeholders, the results chapter responds to one of the key objectives of the research: to provide empirical evidence to determine whether the recovery effort effectively implemented a resilient disaster recovery approach following the earthquake event.

In chapter seven, the results outlined in chapter six are used to highlight the empirical, methodological and conceptual contributions of the research. First, the results are summarized under the conceptualizations of vulnerability, resilience and sustainable livelihoods outlined in the literature review and methodology chapter. While the recovery after the 2006 Yogyakarta earthquake has generally been declared successful, the research provides a more detailed and holistic analysis, suggesting a complex relationship between vulnerability reduction and resilience building. Second, the RDR-AF model is examined as a methodological framework for evaluating recovery, with the results reaffirming the usefulness of the post-disaster framework used in the research. The key components of vulnerability, resilience and livelihoods were found to be relevant, including a focus on place and local conditions. There was a strong correlation between each of the three concepts although the complexity of these relationships was highlighted, particularly for vulnerability and resilience, and sustainable livelihoods and resilience. Thus it was determined that incorporating aspects of vulnerability, resilience and sustainable livelihoods was useful for providing a holistic analysis of the long-term recovery effort after the 2006 Yogyakarta earthquake. Finally, the discussion chapter brings together the key insights from the research, connecting the results of the research to the recovery literature summarized in chapter two, as well as highlighting resilient disaster recovery as a process. The chapter concludes by bringing together the research results into a revised and refined conceptualization of resilient disaster recovery that is built upon the empirical evidence provided from the case study.

The conclusion chapter brings the dissertation back full circle, providing an overview of how the research responded to the objectives and research questions outlined in this introductory chapter. The conclusion chapter also summarizes the practical recommendations for future recovery efforts, based on the research findings. Moreover, topics identified for further research are highlighted, indicating areas where there is a need for additional knowledge in order to contribute to ongoing disaster risk reduction and resilient recovery efforts.

2.0 LITERATURE REVIEW

Disaster management is the continuous process through which individuals, groups and communities attempt to avoid, minimize and/or recover from the risks and damages associated with hazardous events. The disaster management process involves all aspects of preparing for and recovering from disaster events, including mitigation, preparedness, relief/response and recovery (Henstra & McBean, 2005). Mitigation focuses on activities designed to reduce the risk associated with particular hazards, whereas preparedness includes the activities which improve the effectiveness of the community's response to a disaster event. Response and recovery activities occur during the post-disaster period, attempting to fulfill basic needs before transitioning into longer-term rebuilding and recovery processes (EC, 2011). These four pillars of disaster management are intended to work together to reduce the human, physical and financial losses before, during and after a disaster event strikes (Phillips, 2009). Of these four phases, recovery is the most poorly understood and has been the least well researched (Barton, 1969; Coppola, 2007; Lloyd-Jones, 2006; Rubin, Saperstein, & Barbee, 1985; Schwab, 1998).

In order to explore the impacts of the disaster recovery process in the aftermath of the 2006 Yogyakarta earthquake event, it is necessary to outline the key terms, concepts and frameworks used for the research. The following chapter provides an overview of disaster recovery theory and literature, followed by the key concepts (vulnerability, resilience and sustainable livelihoods) incorporated into the framework for this research.

2.1 Disaster Recovery

Disaster recovery encompasses the process of rebuilding, reconstructing and repairing the damages associated with a hazardous event and returning affected areas to a functional condition (Coppola, 2007). Within the disaster recovery literature, there are a variety of different terms, sometimes used synonymously with recovery, other times alluding to more specific components of recovery. In order to clarify how these different terms are used in this paper, recovery is used to denote all the activities, processes and outcomes occurring in the post-disaster period, whereas terms such as reconstruction, rehabilitation and restoration refer to specific aspects of recovery. *Reconstruction* almost exclusively refers to the rebuilding of physical structures that were damaged or destroyed in the disaster. *Restoration* suggests a return to prior conditions, indicating the reversion of physical or social aspects to pre-disaster norms. This is particularly associated with infrastructure, such as

transportation and communication (Haas, Kates, & Bowden, 1977). On the other hand, while *rehabilitation* also refers to some form of restoration, the term is generally used in association with people, as opposed to physical objects. The term also suggests an improvement on pre-existing conditions, as opposed to solely returning to pre-disaster form (Quarantelli, 1999).

Disaster recovery can be further divided into two major phases: short-term recovery and long-term recovery. Within these two phases, the purpose, focus of activities, and the degree of planning are fairly distinct (Phillips, 2009). Short-term recovery activities can be generally associated with initial relief and response phases in the aftermath of a disaster event, although the focus has moved on from provision of basic needs. Here, the focus is on stabilizing the living conditions of affected populations in order to prepare for the longer-term recovery initiatives. Short-term recovery activities generally include the provision of transitional shelter, restoration of critical infrastructure and the clearance of debris (Coppola, 2007). Long-term recovery, on the other hand, focuses on rebuilding and rehabilitating individuals, households and communities, in order to return to some previous level of functioning, often stated as returning to ‘normal’. Longer-term recovery processes usually require a tremendous amount of resources, often involving a variety of stakeholders and actors, going beyond the provision of essential needs and ideally moves towards longer-term economic and social development (Coppola, 2007). While not always the case, Schilderman (2010) argues that aid approaches between these two phases should also shift. While initial recovery phases focus on supply-driven provision of relief, the longer-term recovery phase should focus on support-driven, people-centred reconstruction and rehabilitation. The longer-term phase of recovery is also increasingly viewed as a time for renewal and improvement on pre-existing conditions, and is discussed further in section 2.1.2 (Kenny, Clarke, Fanany, & Kingsbury, 2010).

While the short-term recovery period is often easy to delineate, longer-term recovery is harder to define. Recovery activities have a tendency to transition into development activities, particularly in developing countries, thereby making it difficult to distinguish long-term recovery from on-going development projects (Anderson & Woodrow, 1998). In the case of major disaster events that required external assistance, long-term disaster recovery has been defined as the period in which external government and humanitarian organizations continue to be involved in reconstruction, recovery and capacity building activities (adapted from definitions of disaster by Blaikie, et al., 1994; UNISDR, 2004; Wisner, et al., 2004). This implies the affected area is receiving some form

of specialized funding or programming specifically due to the disaster that goes beyond funding typical for the region. Furthermore, the implication is that recovery is finished once formal operations end. Often, there is little information regarding the potential ongoing processes of recovery that may continue in the aftermath of formalized programming: it is during this period that the research seeks to understand, assess and evaluate long-term recovery initiatives.

As one of the key objectives of the research is to contribute to knowledge regarding the conceptualization and process of resilient disaster recovery, an overview of the current literature is required in order to establish existing knowledge and identify key gaps. The following section provides an overview of historical disaster recovery research and theory, followed by an overview of existing recovery paradigms and key gaps in the literature.

2.1.1 Disaster Recovery Theory

The earliest studies of disaster recovery focused on describing the processes that occur during the recovery period, as well as describing behavioral reactions both during and after disaster events. Barton (1969) summarized the existing disaster recovery literature up to 1970 with his work on the nature of social response to chronic and rapid-onset disaster events in both developing and developed country contexts. His work found patterns of organizational behavior, exploring how individuals and communities respond during recovery periods, including:

- 1) The replacement of local government institutions that are often unable to effectively cope and respond with improvised emergency government agencies (such as a citizens committee or in conjunction with provincial/state or national agencies);
- 2) The responsibility of relief and reconstruction activities tends to be given to voluntary, humanitarian organizations that often compete for funds and recognition, possibly leading to breakdown in coordination;
- 3) Public response to organizations is driven both by rational assessment of achievements, as well as by symbolic actions; bureaucratic and emotionally neutral responses tend to create misunderstanding and even hostility;
- 4) Antagonism and group conflicts may resurface during the recovery and reconstruction period overcoming the collaboration and solidarity experienced in the immediate aftermath of the disaster.
- 5) As large-scale events overwhelm local capacity, major national programs are required to aid local responses and increase efficiency (Barton, 1969, p. 284).

One of the earliest studies to systematically analyze the recovery process was that of Haas, Kates, and Bowden (1977) who argued that “disaster recovery is ordered, knowable and predictable” (p. xxvi). After exploring the reconstruction and recovery efforts of four major disasters (three in the United States, one in Nicaragua), they developed a disaster recovery model that divided the recovery process into four distinct, but overlapping periods:

- 1) Emergency Period: the initial period following the disaster, lasting a few hours or days, where the community begins to cope with losses of life, property and injury as well as initiating the beginning of cleanup. The normal functioning of the community is disrupted during this period. In disaster management cycles, the emergency period is generally referred to as the response phase.
- 2) Restoration Period: covers the time where major services, transportation and communications are restored. Depending on the community and resources available, this period may take several weeks or months.
- 3) Replacement Reconstruction Period: the city’s capital stock is rebuilt to pre-disaster levels, and social and economic activities return to pre-disaster levels or higher.
- 4) Commemorative, Betterment and Developmental Reconstruction Period: involves three interrelated functions, including memorials and commemorations of the disaster events, major reconstruction activities to improve the city and to begin future growth and development (Haas, Kates, & Bowden, 1977, p. xxvii).

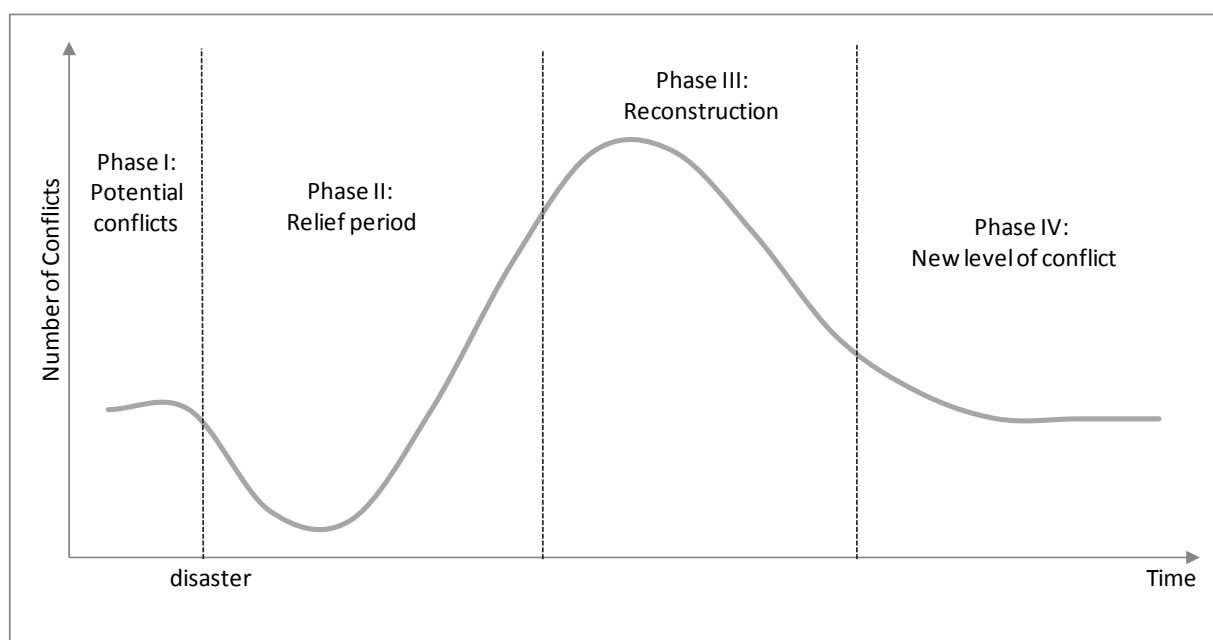
According to the recovery model, the length of time required to complete each period is based on a logarithmic relationship, in that each period lasts approximately ten times longer than the previous period, although recovery and reconstruction times are also “a function of pre-disaster trends, the damages suffered, the resources available for recovery, and, to a lesser degree, leadership, planning and organizations” (Haas, Kates, & Bowden, 1977, p. 1). While Haas, Kates and Bowden’s (1977) model offered one of the first theories of disaster recovery, others have criticized the model for its linear, value-added approach, as well as its lack of explicit recognition of the politics involved in disaster recovery (Berke, Kartez, & Wenger, 1993; Schwab, 1998).

Geipel (1982) examined the role of historical heritage, culture and politics on the perception of hazards and the recovery process through the study of reconstruction after the 1976 Friuli earthquake in Italy. He discovered that the disaster event heightened pre-existing inequalities and that the “original hierarchy of functions, persons, and power relationships asserts itself rather more sharply than ever, and it is very hard even for relief policies to change” (Geipel, 1982, p. 180).

While the elderly and financially weak were disadvantaged as a result of the 1976 Friuli earthquake, merchants and trades people gained from the post-disaster recovery operations.

Like Haas, Kartez and Bowden (1977), Geipel (1982) noted that the time required for reconstruction is a function of the damages suffered, pre-existing economic trends and the presence of local resources for recovery. Geipel's work also focused on the conflicts experienced during the recovery period as planners and developers establish grandiose rebuilding plans that compete with local citizens' ideas for reconstruction – which are usually to see the area rebuilt to pre-disaster norms. This is supported by other recovery research that found local citizens exert tremendous pressure on governments to rebuild the community to its pre-disaster form and that other forms of conflict arise from the distribution of relief and recovery aid (Mileti, 1999; Mustafa, 2003; Schwab, 1998). These findings are depicted in the conflict model of recovery in Figure 2.1.

Figure 2.1: Conflict Model of Recovery



Source: (Geipel, 1982, p. 172)

In Geipel's (1982) model, there are a number of pre-existing potential conflicts (phase I), although the disaster event itself acts as a catalyst for solidarity, sacrifice and mutual helping (phase II). As external interventions begin and relief aid is distributed, conflicts begin to arise and during the reconstruction planning phase, conflicts reach a maximum (phase III). Issues of class, culture, and in the case of Friuli, historical heritage, create differing perceptions on needs, rebuilding plans and

the role of government and external intervention in the recovery process. As reconstruction comes to an end, the number of conflicts decreases as individuals' and families become accustomed to the new circumstances and living arrangements (Geipel, 1982).

Rubin, Saperstein, and Barbee (1985) explored the difficulties in measuring recovery as an outcome. After examining how previous research had attempted to use recovery as a dependent variable, they made the decision to conceptualize recovery as a process: "recovery is an ongoing process and, therefore, difficult to measure once and have that suffice" (Rubin, Saperstein, & Barbee, 1985, p. 14). Conceptualizing recovery as a process has a definitive impact on how assessments of recovery efforts are conducted and this view has been increasingly adopted in recovery research (Brown, et al., 2008; Mileti, 1999). Mileti (1999) focuses on recovery as a process incorporating "not just a physical outcome but a social process that encompasses decision-making about restoration and reconstruction activities...[and] also stresses the nature, components, and activities of related and interacting groups in a systematic process and the fact that different people experience recovery differently" (p. 229 – 230).

The recovery framework developed by Haas, Kartz and Bowden (1977) was critiqued by Rubin, Saperstein, and Barbee (1985) who found that the recovery process did not always imitate the sequential phases set out by their model and that "issues frequently crop up in simultaneous or illogical sequences" (p. 6). Rubin, Saperstein, and Barbee (1985) also found that local governments, particularly in the United States, have increased their capacity to respond to disasters, limiting the need to supplant them with emergency government agencies, as suggested by Barton (1969). For example, Lewis (1999) observed that supplanting indigenous administrative units with non-indigenous equivalents may result in reduced "local capacity to identify, assess and to adjust those structural weaknesses that exacerbate vulnerability" (p. 159). On the other hand, this finding is contradicted by research on more recent disaster events, particularly in developing countries, which found that the establishment of coordinating reconstruction and recovery agencies has helped facilitate the recovery process and increased communication and coordination among the many actors involved in reconstruction after large-scale disasters (for example: see Rehabilitation and Reconstruction Agency (BRR) in Aceh, Indonesia after the 2004 Indian Ocean tsunami) (Fengler, Ishan, & Kaiser, 2008). These findings indicate a need for further research on the characteristics of successful post-disaster recovery and reconstruction agencies.

Rubin, Saperstein, and Barbee (1985) developed a framework for examining important elements of the recovery process (see Figure 2.2). Unlike Haas, Kartez and Bowden (1977) and Geipel (1982), Rubin, Saperstein, and Barbee (1985) focus on the roles of leadership, organizational knowledge and the capacity to implement formalized programming as three key elements necessary to increase efficiency and reduce the length of disaster recovery.

Figure 2.2: Elements of the Recovery Process



Source: (Rubin, Saperstein, & Barbee, 1985, p. 18)

During the recovery process, recovery operations are influenced by larger-scale national policies and conditions, as well as the needs and demands of local populations. According to the model, if the community is able to effectively integrate knowledge, leadership and implementation capacity in order to meet the needs and demands of the local population, the overall community recovery program will be improved (Rubin, Saperstein & Barbee, 1985). While the focus is almost exclusively on political leadership, Alesch (2004) acknowledged that although local governments can influence community recovery, overall “whether a community system survives and becomes viable in the post-event setting depends in part on the individual choices of a critical mass of people and institutions (automata) in the community” (p. 7). This suggests further information is required regarding the role of political leadership and collective action during recovery periods.

Berke, Kartez, and Wenger (1993) focused on inter- and intra-community relationships to explore the success of disaster reconstruction and recovery processes. The roles of horizontal and vertical linkages are explored in order to develop a typology of communities based on the types of relationships present. Horizontal relationships refers to the level of formal and informal integration of people and organizations in a equalitarian manner whereas vertical integration refers to the level of relations between various social units and organizations in the community to external social, economic and political institutions (Berke, Kartez, & Wenger, 1993). The quality of both vertical and horizontal relationships can impact disaster recovery as they inevitably reflect the capacity to influence and organize effective recovery programs that meet the needs of the community and impacted households. As shown in Figure 2.3, the horizontal and vertical integration model of recovery suggests that Community type I is in an ideal position to recover effectively from a disaster event, whereas Community type IV may face significant difficulties during recovery due to lack of social cohesion and lack of access to and influence over external resources (Berke, Kartez, & Wenger, 1993).

The horizontal and vertical integration model offers important insight into community characteristics that can influence the success of disaster recovery: they reflect access to power and links to important social networks. The model highlights the necessity for both vertical and horizontal social capital that increase community coping capacity and provides direction for community improvement. Unfortunately, there is little focus on the processes that create ‘strong’ and ‘weak’ communities, as well as how this can be achieved through the recovery process itself.

Figure 2.3: Horizontal and Vertical Integration Model of Recovery

Vertical	Strong	Weak
Horizontal		
Strong	Community Type I	Community Type II
Weak	Community Type III	Community Type IV

Source: (Berke, Kartez, & Wenger, 1993, p. 102)

Some of the more recent research on disaster recovery has explored the geographical aspects of disasters and recovery processes. Concepts of place and the unique ways in which larger-scale processes manifest themselves in local conditions have been found to have an impact on the level of disaster impacts as well as capacities for overall recovery and rehabilitation (Cutter, 1996). Edgington (2010) explored these ideas in his research on disaster recovery after the 1995 Kobe

earthquake through the dual lenses of ‘geography of crisis’ and ‘geography of opportunity’. Understanding the ‘geography of crisis’ involves examining the spatial relationships that contribute to patterns of social and economic stresses following a disaster event. He argued that disasters create distinct spatial and social outcomes through the distribution of damages and victims, as well as responses to recovery initiatives. Thus, the experience of recovery will be different among different groups, actors and communities (Edgington, 2010). On the other hand, disaster events also create a ‘geography of opportunity’, whereby there is an explicit understanding of the unique role that disasters can play in terms of creating a space for rebuilding and community improvements (Edgington, 2010). This approach dovetails with recent understandings that view the recovery period as a ‘window of opportunity’ to implement disaster risk reduction initiatives (Birkmann, et al., 2010; Christopolos, 2006; Lloyd-Jones, 2006). In this sense, the disaster event can be seen as an opportunity to improve social conditions and overall functioning of the affected community.

2.1.2 Disaster Recovery Paradigms

As the disaster recovery literature matured throughout the 1980’s and 1990’s, research has moved away from descriptions of the recovery process towards a paradigm for disaster management that incorporates mitigation components designed to reduce vulnerability and susceptibility to future disaster events. Mileti (1999) argued that a shift in thinking in disaster management is required to: adopt a global systems perspective; accept responsibility for hazards and disasters; anticipate ambiguity, constant change, and surprise; reject short-term thinking; take a broader, more general view of social forces and their role in hazards and disasters, and; embrace the principles of sustainable development (p. 26 – 29). Embracing the sustainable development movement as a core component of this proposed shift in thinking, Mileti (1999) advanced the sustainable hazards mitigation paradigm to consolidate ideas originally formulated decades ago by Gilbert White and colleagues, as well as integrating ideas from more recent research. The sustainable hazards mitigation approach has six central components, including:

- 1) *Maintaining and enhancing environmental quality*: as a fundamental element of the sustainable development concept, hazard mitigation efforts should be linked to efforts to reduce environmental degradation.

- 2) *Maintaining and enhancing people's quality of life*: exploration of the impacts of structure and agency in increasing individual, household and community access to various resources to increase their quality of life.
- 3) *Foster local resilience to and responsibility for disasters*: particularly during the recovery period where political pressure to increase safety and build community coping capacity is high.
- 4) *Recognize that sustainable, vital local economies are essential*.
- 5) *Identify and ensure inter- and intra-generational equality*: leading to fair and equal distribution of resources and hazards across the population, including different regions, genders, ethnic groups and cultures.
- 6) *Adopt a consensus-building approach*, beginning at the local scale through the process of local participation (Mileti, 1999, pp. 31-34).

The sustainable hazards mitigation approach acknowledges that hazards and disasters are not experienced in isolation – they are linked to broader systems and processes (Mileti, 1999). Through this perspective, the similarity between the goals of vulnerability reduction and sustainability are acknowledged (Lewis, 1999). This approach connects disasters to everyday activities that have a bearing on disasters as well as viewing disaster reduction and recovery as a process. Furthermore, this approach relates disasters to development activities and explores the complex relationship between the two (McEntire, et al., 2002). Through the actions taken during the post-disaster recovery period “every action taken on account of one disaster must be designed and managed also to reduce vulnerability of the future. In this way, vulnerability reduction itself would be socially and environmentally sustainable development” (Lewis, 1999, p. 143).

The sustainable hazards mitigation approach has been adopted by other researchers and organizations, including the United Nations Development Programme (UNDP), through their sustainable recovery framework. This framework offers ten guiding principles for implementing “disaster risk reduction and the promotion of development that is participatory and equitable”, including mainstreaming disaster risk reduction in the recovery and development process; improving and maintaining coordination among disaster response and recovery organizations; promoting participatory and decentralized approaches; enhancing safety standards and integrating risk reduction into reconstruction, recovery and development; improving the living conditions of affected communities and sectors; building local and national capacities for increased resilience, risk management and sustainable development; taking advantage of previous or ongoing

initiatives; incorporating a gender sensitive approach; demonstrative effects; and continued monitoring, evaluation and learning (UNDP, n.d., pp. 3-8).

An alternative disaster paradigm presented by David McEntire (see McEntire 1998; 2000; 2001) critiqued the sustainable hazards mitigation (sustainable recovery) approach, arguing that sustainable development is an unclear concept, does not directly contend with the root causes of disaster (namely vulnerability) (see also Wisner, et al., 2004) and is not particularly well suited to non-natural hazardous events, such as industrial/transportation accidents. Building upon the strengths of Mileti's work, David McEntire's concept of invulnerable development is defined as "development pursued in such a manner as to address vulnerabilities, and thereby decrease the probability that social, political and economic progress will be set back by disaster" (McEntire, 1998, p. 216). This approach is specifically designed to reduce risk and susceptibility, as well as increasing resistance and resilience to disasters. Invulnerable development asks the question: 'how can vulnerability be minimized in order to reduce occurrence of disaster and safeguard the progress of development?' whereas sustainability asks 'what should be done to promote the continuation of development?' (McEntire, 2000, p. 59). The four tenets of the invulnerable development approach include:

- 1) Development that initiates a variety of well-thought-out activities and programs designed to reduce existing vulnerabilities and avert the creation of additional vulnerabilities;
- 2) Development that acts as a form of progress that attempts to avoid promoting or contributing to the probability of disaster;
- 3) Development that seeks to promote social, political and economic advances while at the same time, minimizing the likelihood of those advances being reversed by a disaster event;
- 4) Through the promotion of safe and continued progress, invulnerable development recognizes that the response of both the community and external agents after a disaster event can work to either perpetuate and further entrench vulnerability or to break out of the vulnerability cycle (McEntire, 2001, pp. 193-194).

Although the concept of invulnerable development does not specifically relate to processes of recovery and reconstruction, the concept can be applied through all phases of a disaster. Through an explicit focus on vulnerability, the role of physical, social, cultural, political, economic, technological and developmental factors that contribute to disasters is recognized and offers an approach that focuses on the conditions that people have control over. Thus, if the invulnerable

development paradigm was adopted during the disaster recovery process, there would be an attempt to:

- 1) Link development activities to vulnerability reduction;
- 2) Foment a culture of safety, prevention and preparedness among all individuals, families, groups, businesses, organizations, communities, and nations around the world; and
- 3) Increase the capacities, cooperation, coordination and effectiveness of all public, private and non-profit organizations and agencies involved in or related to disaster management and vulnerability reduction (McEntire, 2001, p. 193).

Here, the post-disaster context is viewed as a period where efforts can be directed at increasing the resilience of individuals and communities in the face of future hazard threats. Thus, disaster events can provide a ‘window of opportunity’ to improve on pre-existing conditions during the recovery period. This ‘build back better’ approach has been increasingly incorporated into the vernacular and overall objectives of both governments and humanitarian organizations when framing their disaster recovery programs, particularly after the 2004 Indian Ocean Tsunami. Alexander (2006) argues that in order for the concept of ‘build back better’ to be effective, it must be operationalized under a holistic framework that offers a comprehensive vision of the future. While a comprehensive framework in the recovery literature is lacking, Clinton (2006) outlines ten key propositions for building back better including:

Proposition 1: Governments, donors, and aid agencies must recognize that families and communities drive their own recovery.

Proposition 2: Recovery must promote fairness and equity.

Proposition 3: Governments must enhance preparedness for future disasters.

Proposition 4: Local governments must be empowered to manage recovery efforts, and donors must devote greater resources to strengthening government recovery institutions, especially at the local level.

Proposition 5: Good recovery planning and effective coordination depend on good information.

Proposition 6: The United Nations, World Bank, and other multilateral agencies must clarify their roles and relationships, especially in addressing the early stage of a recovery process.

Proposition 7: The expanding role of non-governmental organizations (NGOs) and the Red Cross/Red Crescent Movement carries greater responsibilities for quality in recovery efforts.

Proposition 8: From the start of recovery operations, governments and aid agencies must create the conditions for entrepreneurs to flourish.

Proposition 9: Beneficiaries deserve the kind of agency partnerships that move beyond rivalry and unhealthy competition.

Proposition 10: Good recovery must leave communities safer by reducing risks and building resilience (Clinton, 2006, p. 3).

These propositions incorporate many of the ideas from the post-disaster recovery literature, including addressing some of the underlying vulnerabilities and inequalities as well as linking recovery efforts to longer-term development and sustainable initiatives. On the other hand, propositions may create controversy through differing ideologies on development and the strategies used to achieve these goals. For example, Proposition 8 focuses on promoting entrepreneurship through a variety of means, including tourism, which may be in conflict with local desires or economic/political restrictions on entrepreneurship.

In terms of measuring and analyzing the concept of ‘build back better’, Kennedy, et al., (2008) explore the difficulties in interpreting the meaning of ‘better’. A variety of factors influence the perceptions local people and aid organizations have of ‘better’, and trade-offs exist between the many potential forms of betterment. Within the tsunami recovery effort, the practical constraints of funding mandates, timelines and organizational foci, as well as different levels of concern for the product as opposed to the process, led to diminished opportunities to ‘build back better’. In trying to balance the variety of perceptions, needs and risks in the community, the interpretation in some sectors was to ‘build back faster’ as opposed to ‘build back better’ (Coppola, 2007; Kennedy, et al., 2008). Based on these findings, it is clear that although governments and aid organizations may claim to be building back better, there is a lack of clarity of what ‘better’ entails and a lack of a conceptual framework to drive recovery efforts (Regnier, Bruno, Scuteri, & Miniati, 2008).

2.1.3 Gaps in the Disaster Recovery Literature

While the above sections have highlighted the disaster recovery and reconstruction knowledge that currently exists, this knowledge focuses on temporal descriptions of the recovery process, guidelines for improving recovery (particularly focusing on the behavior of NGOs and government organizations), or on strategies for successful recovery. A number of gaps exist in the literature in terms of conceptualizing effective and resilient disaster recovery, as well as understanding the impacts and processes of disaster recovery. The following section highlights some of the key gaps

in the recovery literature with a brief overview of how this research seeks to address some of these gaps.

One of the key issues in terms of understanding disaster recovery is the lack of assessments and studies on the long-term impacts and processes of disaster recovery (Edgington, 2010). Despite the fact that large amounts of money have been spent to rebuild after disaster events, “there is rarely any systematic consideration of whether such lengthy projects actually achieve the goals for which they were implemented” (Labadie, 2008, p. 576). Alesch (2004) argues that expenditures have been based on simplified recovery theory that sees recovery mainly in terms of rebuilding and restoring buildings and infrastructure. Researchers and aid organizations alike have increasingly identified the need for a systematic, independent and replicable framework and approach for monitoring, evaluating and measuring the longer-term relief and recovery operations of major disaster events (Brown, et al., 2008). Cuny (1983) argues that methodologies for assessing recovery operations should focus on the contributions of the program to the community. These can be divided into short-term (exploring how well suffering was alleviated, support of local coping strategies, and the length of time between the disaster and full-recovery) and long-term contributions. The longer-term contributions are more difficult to assess and should include a measure of a) the program’s success in contributing to the development of capacity and skill of both local leadership and institutions; b) the spin-off benefits, including broader-scale development goals; and c) the level of increased safety and reduction of vulnerability to future hazards (Cuny, 1983, pp. 158-159).

Several researchers, including Brown et al. (2008) and Masten and Obradovic (2008), summarize methodological issues associated with evaluating disaster recovery. These include the timeframe and scale of the assessment, as well as the perceptions of the researcher:

- 1) *Timeframe*: as the length of time of recovery can vary from place to place, overall declarations of success or failure for recovery operations may be premature. The overall fate of households and businesses may take years to be fully realized and employment and economic output may ebb and flow with the recovery process (i.e. large-scale reconstruction of buildings and infrastructure will have positive benefits for construction markets). Unpredictable events and the timelines of external organizations involved in the recovery effort may have an influence on the timeframe of recovery (see Alesch, 2004).

2) *Scale*: measuring recovery at different scales may produce different results based on different interpretations. A holistic approach should analyze recovery at various scales within the community to provide appropriate information on the context of recovery.

3) *Perceptions*: As the evaluation is based on the goals and perceptions of the evaluator, overall assessments of recovery will be a reflection of the fundamental value-system of the evaluator (Alexander, 2006; Brown, et al., 2008; Masten & Obradovic, 2008).

While there are some examples of evaluations on recovery and reconstruction projects, including USAID's response to Hurricanes Mitch and Georges, as well the 2004 Indian Ocean tsunami, these evaluations have a tendency to focus on spending by aid organizations themselves as well as whether the intended goals were achieved (see Labadie, 2008; Fengler, Ishan, & Kaiser, 2008). In this sense, these evaluations were not necessarily focused on whether or not the people of the community had increased their standard of living and capacity to cope with future events. Assessments of this type align with Labadie's (2008) performance auditing approach which uses the principles of financial statement audits to examine the "financial position, results of operations, and [whether] cash flows [are] in conformity with generally accepted accounting principles" (p. 580). A similar approach was advocated by Winningham (2009) where evaluations of projects focused on whether they were completed, completed on time and in-line with budgeted planning. While specific project evaluations would be important to ensure the reputation of the aid organization in the eyes of donors, this approach does not necessarily ensure that the programming goals of the organization have led to sustainable development initiatives, invulnerable development and increased resilience in the face of future hazardous events.

Thus, there is a gap in the literature in terms of identifying appropriate strategies, methods, and frameworks for assessing and evaluating long-term disaster recovery. This research attempts to fill these gaps in the recovery literature through its main objectives of providing a conceptualization of resilient disaster recovery that can be used as a methodological framework for assessing long-term recovery efforts. Through this approach, an empirical assessment of a long-term recovery effort will be completed and used to form an understanding of disaster recovery as a process and further contribute to the disaster recovery literature.

2.2 Framing Disaster Recovery Assessments

In order to fill these identified gaps in the literature, a framework for understanding and assessing resilient disaster recovery is required. For the purposes of this research, resilient disaster recovery

is defined using three key concepts, namely vulnerability, resilience and sustainable livelihoods. Each of these concepts has been included due to their contributions for understanding the processes that impact both the pre-, during, and post-disaster experience. The concepts of vulnerability, resilience and sustainable livelihoods are each discussed below, followed by an overview of why they were chosen and how they contribute to an understanding of holistic disaster recovery.

2.2.1 Vulnerability

As vulnerability is a concept used in a variety of literatures, there are different understandings and approaches (Birkmann, 2006). Villagrán's (2006) review of the vulnerability literature determined that the term has been perceived through a variety of meanings, including:

1. As a particular condition or state of a system before an event triggers a disaster, described in terms of criteria such as susceptibility, limitations, incapacities or deficiencies e.g. the incapacity to resist the impact of the event (resistance) and the incapacity to cope with an event (coping capacity);
2. As a direct consequence of the exposure to a given hazard; and
3. As the probability or possibility of an outcome of the system when exposed to an external event associated with a hazard, expressed in terms of potential losses such as fatalities or economic losses, or as the probability of the person or a community reaching or surpassing a certain benchmark (Villágran, 2006, p. 11).

Within the hazards literature, recent approaches view vulnerability as a pre-existing condition, influenced by a variety of social, economic and political structures (Birkmann, 2007; Blaikie, et al., 1994; Cannon, Twigg, & Rowell, 2003; Hewitt, 1997; Pelling, 2003). While many authors see vulnerability as similar to poverty, marginalization or other forms of disadvantage, others argue that these concepts are not one and the same (Cannon, Twigg, & Rowell, 2003). Cannon (2000) argues that the concept should have a predictive quality, in that an analysis of vulnerability should be able to predict vulnerable populations, since vulnerability "is supposedly a way of conceptualizing what may happen to an identifiable population under conditions of particular risks and hazards" (Cannon, Twigg, & Rowell, 2003, p. 4). In this sense, vulnerability, and the analysis thereof, should provide a measure and direction for mitigation interventions and strategies. Furthermore, this suggests that vulnerability occurs within particular contexts: there is recognition that vulnerability to one particular hazard does not necessarily translate into vulnerability to other

hazards, implying the need to identify what the individual, household or community is vulnerable to (Ellis, 2003).

Anderson and Woodrow (1998) argue that through the exploration of vulnerability, an understanding of why the disaster occurred, the level of impact, as well as why particular groups of people were more or less severely impacted can be reached. While Cannon, Twigg, & Rowell (2003) emphasize the predictive quality of vulnerability, they also stress the human dimensions. Hazards impact individuals', groups' and communities differently, depending on a variety of factors, including levels of preparedness, ability to cope and recover, and livelihood strategies. Accordingly, "it is especially important to recognize this *social* vulnerability as much more than the likelihood of building to collapse or infrastructure to be damaged. It is crucially about the characteristics of *people*, and the differential impacts on people of damage to physical structures" (Cannon, Twigg, & Rowell, 2003, p. 5). By focusing on the socially constructed nature of vulnerability, the larger-scale processes that are a reflection of the power relations in a given society are emphasized (Blaikie, et al., 1994; Cannon, Twigg & Rowell, 2003; Hewitt, 1997). This is similar to Hewitt's (1997) work which argued that access to power in a variety of forms was one of the fundamental processes impacting differing levels of vulnerability.

From this perspective, vulnerability can be defined as "the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard" (UNISDR, 2009, p. 30). This definition provides an understanding of vulnerability as pre-existing condition that exists before, during and after a disaster event and will significantly impact coping capacity and levels of resilience. Thus, some of the main factors that influence levels of vulnerability include access to various forms of tangible and intangible assets (such as social and material goods), access to knowledge and information, and access to power and rights (Alexander, 2000; Blaikie, et al., 1994; Chambers, 1989; Hewitt, 1997; Pelling, 2003).

A number of effective vulnerability models have been outlined in the literature, including Chambers (1989) internal/external understanding of vulnerability; Watts & Bohle's (1993) model of vulnerability that incorporates human-ecological perspectives, entitlement theory, political economy approaches, action theory approaches, models exploring access to assets, as well as crisis and conflict theory; Wisner & Luce's (1993) examination of vulnerability and marginalization; Blaikie et al.'s (1994) and Wisner et al.'s (2004) pressure and release/access model of vulnerability; Cutter's (1996) hazards of place model of vulnerability; the BBC (based on work by

Bogardi and Birkmann (2004) and Cardona (2004)), model of vulnerability outlined by Birkmann and Fernando (2008); as well as various understandings of the different types of vulnerability outlined by Liverman (1990), Hewitt (1997), Alexander (2000), Pelling (2003), and Cardona (2004). An overview of these vulnerability theories and models demonstrates how initial approaches to vulnerability, while incorporating both social and physical features, presented them as separate, independent processes. As the literature moved towards detailed analysis of social vulnerability, the physical and environmental processes were somewhat ignored. This led to a search for an understanding of vulnerability that incorporated both social and environmental processes and acknowledged the complex interactions between them. Through this shift in thinking, vulnerability theories have broadened from human-centred approaches that focused on the intrinsic vulnerability of the individual to approaches that incorporate coping capacities and the building of resilience. Birkmann (2007) notes how “the concept of vulnerability has been continuously widened and broadened towards a more comprehensive approach encompassing susceptibility, exposure, coping capacity and adaptive capacity, as well as different thematic areas, such as physical, social, economic, environmental and institutional vulnerability” (p. 21). Table 2.1 outlines some of the key concepts highlighted by these various models and theories of vulnerability.

Table 2.1: Key Concepts in Vulnerability Theory and Models

Concept	Contributors
Incorporate both internal (social) and external (environmental) processes	(Birkmann & Fernando, 2008; Cardona, 2004; Chambers, 1989; Cutter, 1996)
Importance of livelihood security	(Blaikie et al., 1994; Watts & Bohle, 1993; Wisner et al., 2004)
Access to various forms of assets	(Blaikie et al., 1994; Chambers, 1989; Watts & Bohle, 1993; Wisner et al., 2004)
Uniqueness of Place	(Blaikie et al., 1994; Cutter, 1996; Joakim E. , 2008; Liverman, 1990; Wisner et al., 2004)
Importance of scale (particularly for assessment)	(Wisner & Luce, 1993)
Focus on the everyday	(Wisner & Luce, 1993)
Balance between structure and agency	(Wisner & Luce, 1993)
Feedbacks on the environment/hazards	(Birkmann & Fernando, 2008; Cutter, 1996; Joakim, 2008; Wisner & Luce, 1993)
Incorporating disaster mitigation and relief/reconstruction activities in the processes that affect levels of vulnerability	(Birkmann & Fernando, 2008; Cutter, 1996; Joakim, 2008)

Focus on the underlying causes of vulnerability	(Blaikie et al., 1994; Hewitt, 1997; Watts & Bohle, 1993; Wisner et al., 2004)
Access to power/powerlessness	(Blaikie et al., 1994; Hewitt, 1997; Wisner & Luce, 1993)
Individual/institutional disaster knowledge/experience/perception	(Alexander, 2000; Cutter, 1996)
Dynamic nature of vulnerability	(Birkmann & Fernando, 2008; Cutter, 1996; Joakim, 2008)
Including capacity/resilience	(Birkmann & Fernando, 2008; Cardona, 2004; Joakim, 2008)
Types of Vulnerability, including	
• Deprived, willful, pristine, primary, secondary	(Alexander, 2000)
• Physical, social, human	(Pelling, 2003)
• Physical fragility/exposure, socio-economic, lack of resilience	(Cardona, 2004)
• Physical, environmental, economic, social, political, technological, ideological, ecological, institutional, educational, health related, cultural	(Wilches-Chaux, 1993)
• Exceptional, everyday	(Lavell, 2004)
• Individual, organizational, community, infrastructural, political, economic, social, location, landscape, environmental	(Joakim, 2008)

2.2.1.1 Pressure and Release Model of Vulnerability

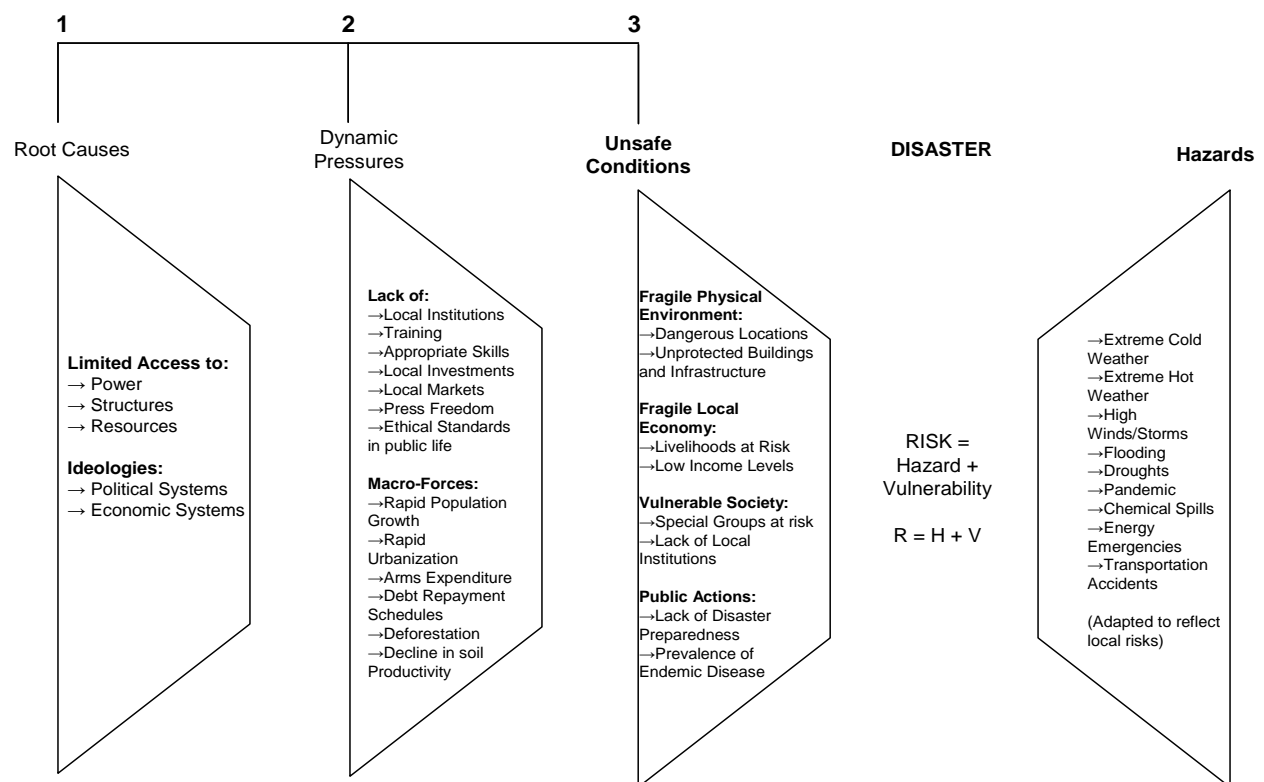
As noted above, a number of frameworks and models have been developed to provide an understanding of vulnerability within the context of hazards. From these frameworks and models, it is clear that the main points of convergence are related to:

- 1) *The exploration of vulnerability from a social-ecological perspective* (see Blaikie, et al., 1994; Bogardi & Birkmann, 2004; Cardona, 2004; Chambers, 1989; Cutter, et al., 2008; Wisner, et al., 2004; Wisner & Luce, 1993)
- 2) *Focus on place and the unique manifestations of larger-scale processes at the local level* (see Cutter, 1996; Cutter et al., 2008; Liverman, 1990; Watts & Bohle, 1993)
- 3) *Conceptualizing vulnerability as a human rights/security issue* (Blaikie, et al., 1994; Chambers, 1989; Pelling, 2003; Wisner, et al., 2004)
- 4) *Focusing on the root causes of vulnerability* (Blaikie, et al., 1994; Pelling, 2003; Wisner, et al., 2004).

The Pressure and Release model of vulnerability (PAR) developed by Blaikie, et al. (1994) is one of the key models to effectively integrate many the significant ideas in the vulnerability literature, and was selected as the conceptualization of vulnerability for this research. Blaikie, et al. (1994)

recognize the significance of examining vulnerability within the context of its underlying causes and origins and the PAR is a schematic expression of the complex interactions between the underlying social processes that create vulnerability and the hazard itself. The model is built upon the juxtaposition between these two opposing forces. In the PAR model, ‘pressure’ builds through increased vulnerability and exposure to hazards, while the ‘release’ conceptualizes the mitigation activities taken to reduce the impact of the disaster – the reduction of vulnerability (Blaikie, et al., 1994). Figure 2.4 depicts the PAR model – specifically the progression of vulnerability from root causes through to their manifestations as unsafe conditions, and possibly, disaster.

Figure 2.4: Pressure and Release Model - Progression of Vulnerability



Source: (Blaikie, et al., 1994, p. 23)

The pressure side of the model indicates a progression of vulnerability that starts with the *Root Causes*, including limited access to power, structures and resources, as well as vulnerabilities created through specific political and economic ideologies. These root causes are widespread processes that impact the distribution of resources and are a reflection of the distribution of power in a society (Blaikie, et al., 1994). Individuals and groups who are marginalized and lacking in power, either economically, politically and/or socially, are exposed to a double source of

vulnerability. These groups are less likely to have secure access to quality livelihoods and resources and they have a tendency towards lower priority for government action and intervention (Blaikie, et al., 1994).

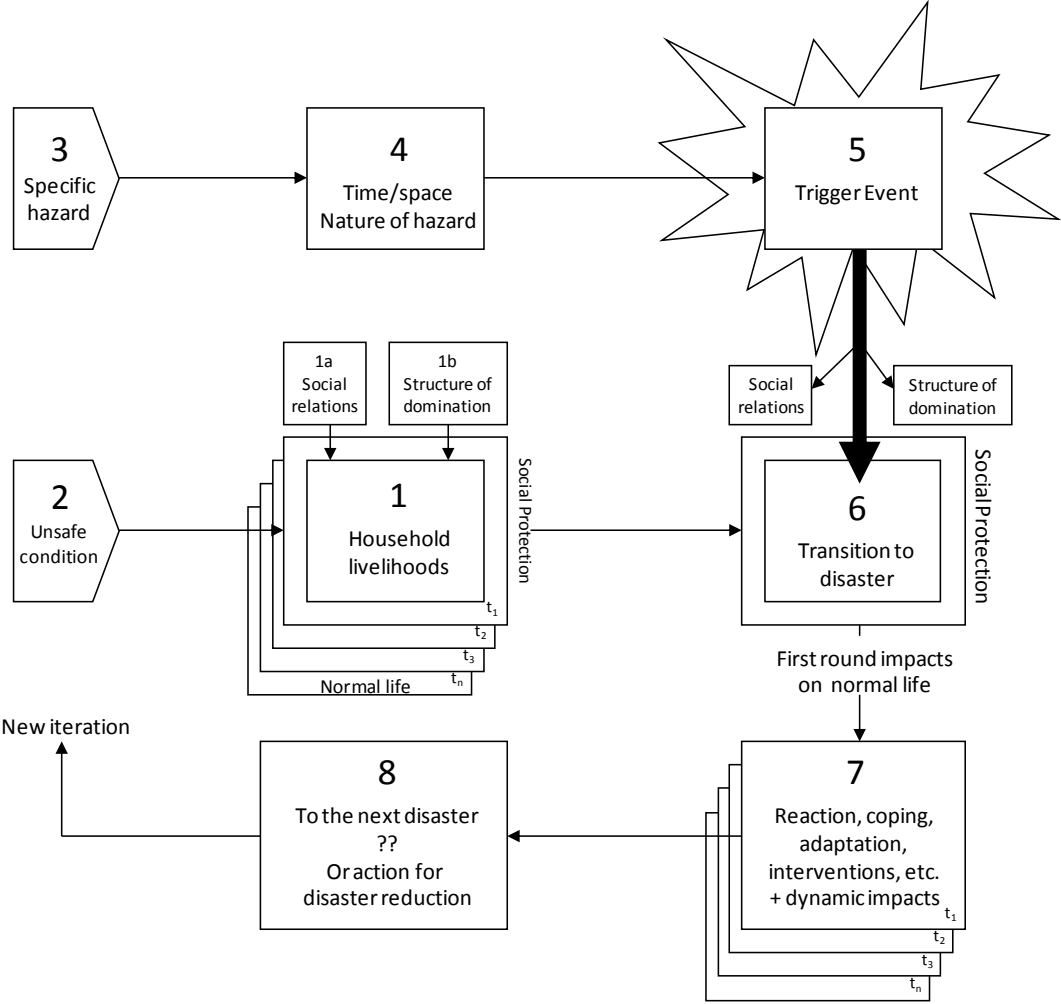
The *Dynamic Pressures* “channel the root causes into particular forms of insecurity” and are visibly manifested as *unsafe conditions* (Blaikie, et al., 1994, p. 24). These processes range from economic investments in human capital to macro demographic trends and environmental sustainability. The unsafe conditions in the PAR model present the visible manifestations of the root causes and are the actual populations that experience vulnerability during a disaster event. Unsafe conditions are the “specific forms in which the vulnerability of a population is expressed in time and space in conjunction with a hazard” (Blaikie, et al., 1994, p. 25). Therefore, each manifestation of vulnerability can be traced back to larger, widespread social, economic and political processes that work to generate vulnerable populations (Pelling, 2003).

The Pressure and Release model has some limitations, including the explicit focus on the ‘pressures’, or vulnerabilities, with little emphasis on the ‘releases’ that could increase resiliencies and overall coping capacity. There is also an inherent oversimplification of the juxtaposition of two opposing forces. This suggests that the hazard is separate from social processes and “independent of the conditions that create vulnerability” (Blaikie, et al., 1994, p.22). As well, the model presents a static depiction of vulnerability: in this model, “the generation of vulnerability is not adequately integrated with the way in which hazards themselves affect people...it exaggerates the separation of the hazard from social processes in order to emphasize the social causation of disasters” (Blaikie, et al., 1994, p. 46). Hence, the focus of the PAR model is the conditions which lead to disaster and does not address recovery from disaster.

To address these concerns, Blaikie, et al. (1994) also developed the ‘Access’ model of vulnerability to examine micro-level access to various capabilities, assets and livelihood strategies that can be drawn upon to cope with a disaster event. Wisner, et al. (2004) updated the Access model, focusing on the “precise interactions of environment and society at the ‘pressure point’, at the point where and when the disaster starts to unfold” (p. 87). The Access model, shown in Figure 2.5 is cyclical in nature and explores how individuals and households manage their access to assets and resources under the structure of social, political and economic systems (Blaikie, et al., 1994). In the Access model, specific hazards exist within time and space characteristics which may result in a trigger event for a disaster. Concurrently, during normal times, households are subject to both

unsafe conditions and political economy structures (social relations and structures of domination) that impact livelihood strategies and the various decisions made over time regarding livelihood opportunities. During a disaster, the trigger event breaks through social protections², while the subsequent coping, reconstruction and recovery strategies may or may not attend to issues of vulnerability, lack of social protections and engage in actions to prevent further harm from hazards (Wisner, et al., 2004). The revised Access model effectively links to the PAR model, focusing on the role of livelihoods and how livelihoods are influenced by both structure and agency. The Access model also explicitly acknowledges the role of mitigation strategies and recovery operations in either perpetuating or reducing vulnerability.

Figure 2.5: The Access Model



Source: (Wisner, et al., 2004, p. 81)

² Defined as the presence or absence of individual, collective and public preparedness and mitigation efforts

The PAR and Access models were selected as the conceptualization of vulnerability in this research due to their explicit incorporation of many of the key ideas in the vulnerability literature. Together, the PAR and Access models provide a comprehensive analytical link between political and socio-economic models of vulnerability. Although emphasis on the physical and environmental aspects of vulnerability is limited, there is an explicit focus on the root causes of vulnerability. Similar to Chambers (1989), as well as Watts & Bohle (1993), Blaikie, et al. (1994) recognize the importance of access to various forms of assets, including access to power. The Access model also focuses on livelihood strategies, indicating the importance of incorporating a livelihoods perspective. The Access Model also explicitly acknowledges the role of recovery and reconstruction operations in perpetuating or reducing vulnerability, as well as incorporating aspects of structure and agency in the process of constructing vulnerabilities. This makes the PAR and Access models an ideal conceptualization of vulnerability to use in order to meet the research objectives set forth in chapter one (further discussion related to selection of the PAR and Access is included in chapter three).

2.2.1.2 Vulnerability and Disaster Recovery

Reducing vulnerability during the post-disaster reconstruction and recovery period has been identified as a key strategy to reduce the likelihood of future disaster events, and as such, was incorporated into the conceptualization of resilient disaster recovery (Birkmann, 2006; Joakim, 2011; Pelling, 2003; Wisner, et al., 2004). Evidence has indicated that in some cases, the post-disaster relief and reconstruction activities perpetuated systems of marginalization and vulnerability (see Mustafa, 2003; Wisner & Luce, 1993; Wisner, et al., 2004). In consequence, there is a need for an explicit focus on vulnerability reduction during the recovery period to attend to issues of marginalization and lack of social protections, and to engage in actions to prevent further harm from hazards.

Recognizing the role of vulnerability during the disaster recovery period allows recovery programs to build on the previous research and knowledge developed in the field of vulnerability studies, and also provides a framework for identifying and planning the goals and objectives of recovery efforts (Lizarralde, Johnson, & Davidson, 2010). Vulnerability frameworks and models outline the various factors and processes that impact the ability of individuals, groups and communities to respond and cope with disaster events, providing an indication of the weaknesses in individual and community capacity to mitigate, cope, respond and recover from disaster events. Through the assessment of

the key components of various conceptualizations of vulnerability, strategies and policies for reducing vulnerability and increasing resilience in the face of future hazards can be achieved. Using vulnerability as a guideline for post-disaster recovery results in a new definition of recovery, whereby it is understood as “the process of improvement of pre-disaster conditions, targeted to achieving long-term local development and disaster risk reduction through the pairing of local and external resources” (Lizarralde, Johnson, & Davidson, 2010, p. 5). This links vulnerability theory to newer paradigms in disaster recovery where the focus is on sustainable mitigation practices, invulnerable development and slogans of building back better, although vulnerability concepts provide a more holistic understanding of ‘better’. Thus, the concept of vulnerability has important contributions for conceptualizing resilient disaster recovery.

2.2.2 Resilience

The concept of resilience originated in the ecological literature, particularly in the study of ecosystems, during the 1960’s and early 1970’s (Folke, 2006; Janssen, Schoon, Ke, & Borner, 2006). Early understandings saw resilience as the “persistence of relationships within a system and is a measure of the ability of these systems to absorb change of state variables, driving variables, and parameters, and still persist” (Holling, 1973, p. 17). As losses associated with hazardous events increased, disaster researchers began to explore concepts of resilience and acknowledged the need for “more inherently resilient social and technological systems, capable of absorbing shocks with grace and designed so that their failure does not lead to inevitable catastrophe” (Foster, 1993, p. 93). While preliminary understandings of resilience focused on ecological systems, the following discussion focuses on resilience in the context of hazards and disasters.

As the resilience concept has been increasingly used in the hazards literature, the number of definitions has begun to increase. Many authors describe resilience as the activities and capacities which allow communities and societies to withstand, rebound and bounce back after disaster events (Foster, 1995; Paton & Johnston, 2006; Ronan & Johnston, 2005). Ferrier (2008, p. 109) defines resilience as the “relative ability of a community to absorb the effects of a hazard event and quickly return to normal, or near-normal, operations”. Buckle, Mars & Smale (2000, p. 9) similarly define resilience although they argue that this approach appears somewhat static and fails to “identify that individuals, groups and communities may each possess degrees of resilience which will vary over time and within each of these categories”. While many definitions focus on the ability to quickly return to normal operations, other authors argue that communities will never

return to the pre-disaster state, as a disaster will result in changes to the physical, social and psychological reality of societal life (Alesch, 2004; Paton, 2006). Focusing solely on the ability to bounce back also assumes that resilient systems can achieve a state of equilibrium, whereas human and natural systems are more accurately seen as chaotic and non-equilibrating (Birkmann & Wisner, 2006). Paton (2006, p. 8) defines resilience as “a measure of how well people and societies can adapt to a changed reality and capitalize on the new possibilities offered”. In this sense, resilience concepts incorporate a measure of the adaptive and transformational capacity of individuals, groups and communities (Folke, Carpenter, Walker, Scheffer, Chapin, & Rockstrom, 2010; Magis, 2010).

From these various understandings, Maguire & Hagan (2007) conceptualize resilience along three different dimensions: resistance, recuperation and creativity (see also Adger, 2000). *Resistance* relates to the ability to withstand or absorb an external pressure or disturbance before long-term impacts are experienced. This view of resilience examines the amount of disturbance a system can absorb before changing state (Maguire & Cartwright, 2008). The amount of time it takes the community to ‘bounce back’ to previous levels of functioning is the *recuperation* approach to resilience. The faster a community is able to return to pre-disaster levels of functioning, the more resilient the community is. While these conceptualizations of resilience are common in the hazards literature, Maguire & Cartwright (2008) argue that the resistance and recuperation approaches are deterministic and fail to incorporate the dynamic nature of people and communities. The *creativity* approach to resilience, on the other hand, is related to the idea of increasing the functionality and resilience of the community after a disaster event. Creativity is the process of mitigating and “adapting to new circumstances and learning from the disaster experience” to create communities that have achieved greater resilience and functionality through the recovery process (Adger, 2000; Maguire & Hagan, 2007, p. 17). This is similar to the approach taken by the Resilience Alliance, where resilience is understood within three dimensions: the ability to absorb, the degree of self-organization, and the capability for learning and adaptation (Kuhlicke, 2010).

The notion of creative resilience leads into the growing body of literature that focuses not only on returning the community to its previous level of functionality, but also as a tool for improving overall welfare conditions (Kumpfer, 1999; Kulig, 2000; Paton, 2006; Ronan & Johnston, 2005). Folke (2006, p. 253) focuses on the positive aspects of disaster events, viewing them as having the “potential to create opportunity for doing new things, for innovation and for development”. In

other words, a hazardous event can be viewed as a catalyst for learning, transformation and growth in the community (Berkes, 2007; Kumpfer, 1999). This view of resilience “accepts that change is inevitable, rather than seeing change as a ‘stressor’ from which a community needs to recover its original state” (Maguire & Cartwright, 2008, p. 5). Conceptualizing resilience from a transformational perspective provides a more structured and nuanced understanding of ‘building back better’ strategies of recovery, and links to the idea of a ‘window of opportunity’. In this sense, communities may use disaster events as a learning platform to initiate a move towards improved mitigation and preparedness programs, as well as increased emphasis on reducing vulnerabilities and building capacities (Birkmann, et al., 2010). This supports the use of a resilience conceptualization that integrates not only the capacity to absorb and cope with hazards, but also aspects of learning, transformation and adaptation.

2.2.2.1 Attributes of Resilient Communities

Many researchers have explored the different components or attributes that contribute to resilient communities, some of which are outlined in Table 2.2 below. These attributes focus on a variety of factors that may influence levels of resilience, including access to resources, the existence of institutions and policies to reduce risk in the community, the capacity to respond to hazardous events, as well as psycho-social components that explore individual and community perceptions, experiences and feelings. This overview of attributes indicates the broad scope of resilience and incorporates aspects from social, economic and political spheres.

Table 2.2: Attributes of Resilient Communities

Author/Date	Description of Components	Strengths and Weaknesses
(Folke, Colding, & Berkes, 2003; Berkes, 2007, pp. 287-288)	Identification of four critical factors that interact to building social and ecological resilience: <ol style="list-style-type: none"> 1) Learning to live with change and uncertainty 2) Nurturing diversity in various forms 3) Combining different types of knowledge and learning 4) Creating opportunity for self-organization and cross-scale linkages 	Broad approach focusing on issues of scale and system dynamics, although there is limited recognition of the power structures within communities and social systems.
(Mayunga, 2007)	Focuses on a capital-based approach to conceptualize resilience, using five categories: social, economic, physical, human and natural, building on concepts from the development and sustainable livelihoods literature	Broad perspective of resilience that links into concepts of sustainable livelihoods although the operationalization of this approach focuses only on quantitative indicators

(Paton, 2006, p. 9)	<p>Resources – required to ensure safety of community and core functions from hazard consequences;</p> <p>Competencies – required to mobilize, organize and use to confront/adapt to encountered problems/issues;</p> <p>Planning/Dev't Strategies – integrate resources at each level to ensure coherent social capacity to capitalize on opportunities for change, growth and enhancement</p> <p>Sustained Availability – ensure resources/competencies available over changes and time</p>	<p>While this approach incorporates access to various resources and human capital, focuses on positive change and incorporates a sustainable approach to resilience, there is under-emphasis on non-capital forms of resilience, including informal social capital networks, disaster experience and knowledge.</p>
(Rose, 2006, pp. 228-229)	<p>Focuses on economic resilience, taking place at three scales (micro, macro and meso) and distinguishing between:</p> <p>Inherent – ability under normal circumstances; and</p> <p>Adaptive – ability in crisis situations due to ingenuity or extra effort</p>	<p>Recognizes different forms, temporal aspects and scales of resilience, although the focus is exclusively economic.</p>
(Pelling & High, 2005, p. 309)	<p>Focusing on resilient adaptation, Pelling & High outline several components derived from the literature, including some degree of overproduction or excess capacity; overlapping functions; rapid flow of materials, investments and information; responsive decision-making at an appropriate subsidiary level; diversification of inputs and of the economic base; alleviation of absolute poverty; learning from past events; mobilizing systems to redistribute costs including insurance; and, active experimentation and support for innovation.</p>	<p>Focus on a variety of areas and aspects that produce resilient and adaptive communities although the focus appears exclusively at the systems level with little input on the role of individual and household factors</p>
(Kulig, 2000)	<p>Emphasis on 3 factors that lead to increased community resilience:</p> <p>1 – Interactions experienced as a collective group or community</p> <p>2 – Expressions of a sense of community</p> <p>3 – Community action</p>	<p>Incorporates aspects of psycho-social well-being although there is limited acknowledgement of other aspects of resilience.</p>
(Tobin, 1999)	<p>Combination of three theoretical models, including:</p> <p>1 – Mitigation model: reducing community risk through policies and standards;</p> <p>2 – Recovery model: policies to aid in relief and recovery operations, leading to re-accumulation of capital/resources;</p> <p>3 – Structural/Cognitive model: includes issues of societal changes, situational factors (i.e. socio-demographics, community characteristics) and cognition (psychological/attitudinal).</p>	<p>Good focus on resilience both before and after a disaster event, as well as psycho-social aspects of resilience. Over-emphasis on policy aspects of resilience, as opposed to building adaptive capacity among individual community members.</p>

From the table of resilient attributes, there are a number of themes that converge with the vulnerability literature, including a focus on access to resources, institutionalized capacity to respond and recover from disaster events, as well as developmental processes of poverty and socio-economic conditions. This leads into the following discussion which links the concepts of vulnerability and resilience.

2.2.2.2 *Linking Vulnerability and Resilience*

To this point, vulnerability and resilience have been discussed separately, although an emerging literature recognizes the complexity and similarities that exists between these two concepts. Adger (2006, p. 269) remarked:

Vulnerability research and resilience research have common elements of interest – the shocks and stresses experienced by the social-ecological system, the response of the system, and the capacity for adaptive action. The points of convergence are more numerous and more fundamental than the points of divergence.

Incorporating resilience with vulnerability concepts is important for three key reasons: “it helps assess hazards holistically in coupled human-environment systems; it stresses the ability of a system to deal with a hazard, absorbing the disturbance or adapting to it; and it helps explore policy options for dealing with uncertainty and future change” (Berkes, 2007; Haque & Etkin, 2007, p. 279). Although the interconnections between vulnerability and resilience have been identified, there is some discrepancy regarding the nature of the relationship between the two concepts.

The more common approach is highlighted in the climate change literature, through the definitions of vulnerability adopted by the Intergovernmental Panel on Climate Change (IPCC). In this approach, vulnerability is seen as a function of exposure, sensitivity and adaptive capacity (Yohe & Tol, 2002). From this perspective, Smit and Wandel (2006) suggest that the concept of vulnerability explicitly incorporates, or is reflective of, the resilience of that system: vulnerability is not viewed as separate from resilience, but as an inherent part of vulnerability (Joakim, 2008; King & MacGregor, 2000; Yohe & Tole, 2002). This is similar to (Adger, 2000), who noted that resilience is a ‘loose antonym’ for vulnerability, in that resilience increases capacity to cope with stress, whereas vulnerability defines the level of exposure to stress. Thus, the IPCC approach views vulnerability and resilience as the positive and negative aspects of a singular concept that can be represented along a continuum (see Berkes, 2007; Birkmann & Wisner, 2006; Barnett, Lambert & Frey, 2008): when vulnerability is reduced, the level of resilience automatically increases (Kasperson & Kasperson, 2001).

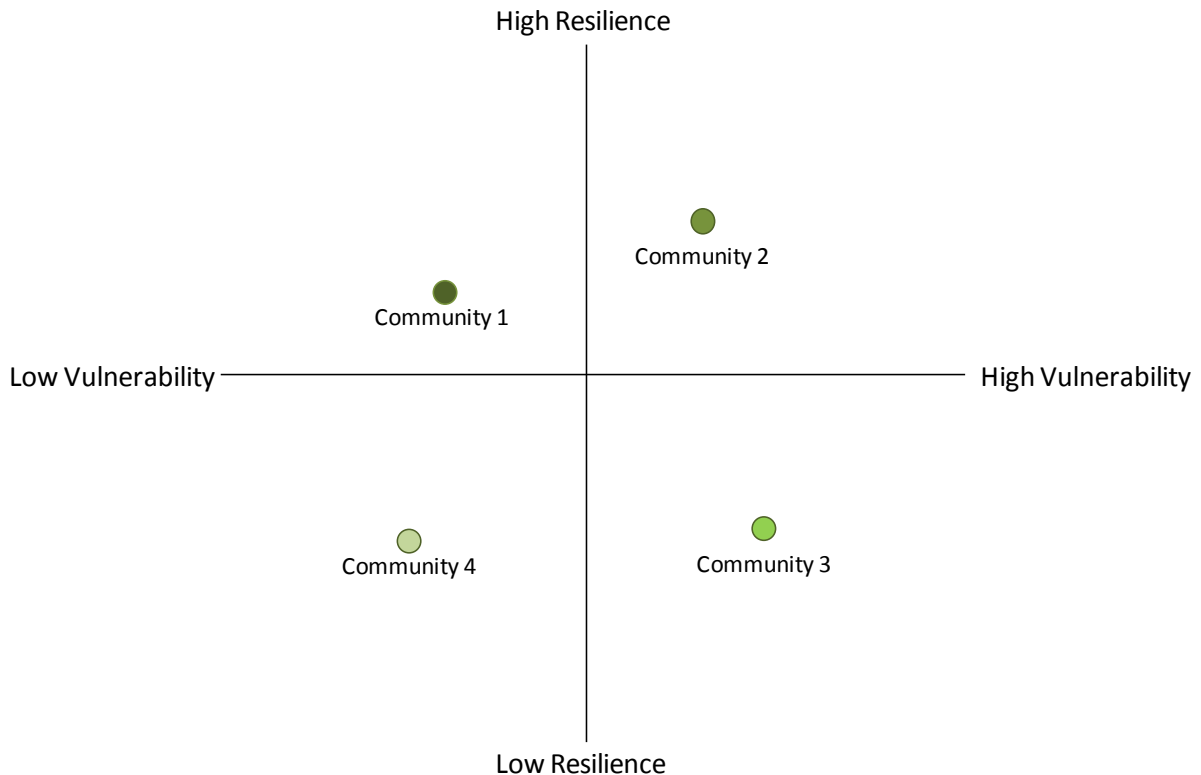
Conversely, the relationship between vulnerability and resilience can be defined as complex and ‘process-oriented’, where the concepts are seen as inherently linked, although distinct (Cutter, et

al., 2008; Doberstein, 2009; Maguire & Cartwright, 2008; Sapountzaki, 2012). As Mayunga (2007) and Klein, Nicholls, and Thomalla (2003) note, defining resilience as the opposite of vulnerability results in circular reasoning and provides limited new knowledge. The complexity of the relationship between vulnerability and resilience can also be observed in contexts where increased resilience can also lead to increased vulnerability. In the case of flood management, protective structures such as levees and insurance can limit the number of events and help during recovery, although communities may become more vulnerable to future flood events through increased sense of security and further development on flood plains (Doberstein, 2009; Gunderson, 2010). Thus, as Buckle, Mars & Smale (2000, p. 13) argue, resilience is not “just the absence of vulnerability”. Instead, resilience should be understood through a multi-structural approach that encompasses broader concepts of adaptive capacity, exposure and the coupled human-environment system. In this way, resilience concepts focus on learning, re-organization and self-change, and it is understood that “vulnerability features may co-exist with characteristics that improve adaptive capacity” (Sapountzaki, 2012, p. 1268).

Taking the process-oriented approach, this research proposes an understanding of the relationship between resilience and vulnerability conceptualized along two separate continuums (x-y axis), thereby creating a set of quadrants in which communities experience differential levels of resilience and vulnerability over time (see Figure 2.6). In the X-Y model, if all four hypothetical communities experienced similar exposure to a hazard, community three would likely experience the highest level of impacts and the most difficulty during the recovery period due to high vulnerability and low levels of resilience. On the other hand, community two, although experiencing high levels of vulnerability, may have less difficulty during the recovery period due to the ability to cope and adapt during the post-disaster period (specific examples of villages from the research will be further discussed in relation to the X-Y model in chapter seven). This is not to suggest that levels of vulnerability and resilience are static; in reality, levels would continuously fluctuate over time, reflecting the dynamic nature of social, political and economic processes, as well as individual, household and community choices that impact vulnerability and resilience. This highlights the need to incorporate both concepts (vulnerability and resilience) in understandings of resilient disaster recovery in order to provide a full overview of the strengths and weaknesses of individual, group and community capacity to mitigate, prepare, respond, and recover from hazardous events. Furthermore, approaching vulnerability and resilience as separate concepts

explicitly recognizes the resiliencies of individuals, households and communities, highlighting the capacities that already exist in impacted regions.

Figure 2.6: X-Y Axis Relationship between Vulnerability and Resilience



Although the relationship between vulnerability and resilience is presented along an axis, there may be some difficulty in the practical implementation of this conceptualization. As the relationship between these two concepts is rather complex, elements or themes of vulnerability and resilience may be difficult to separate along an X-Y axis. Furthermore, the contextualization of factors influencing these concepts suggests that factors selected for one context may not be suitable for other contexts (Birkmann, 2007). A further discussion of themes used to inform the data collection process will be included in chapter 3 where the preliminary conceptual framework for the research is outlined.

2.2.2.3 Resilience and Disaster Recovery

Incorporating resilience into a conceptualization of resilient disaster recovery not only links to ideas of ‘building back better’, but provides a more specific and nuanced understanding of what effective disaster recovery should look like. Resilience perspectives emphasize the ability to

respond and recover from a disaster event, thereby providing an “effective way to cope with change characterized by surprises and unknowable risks” (Berkes, 2007, p. 283). Ride and Bretherton (2011, p. 7) define resilience in relation to natural hazards as “the capacity of a community to cope with the emergency, to rebuild, and to learn from the experience, such that the new physical, social, and political structures are better adapted to the environment”. Consequently, the concept of resilience is explicitly related to the process of recovery, and incorporates an adaptive component whereby resilient communities actively engage in the process of improving upon their pre-disaster conditions. Incorporating resilience concepts in a disaster recovery framework acknowledges the transformational capabilities of disaster-affected communities and highlights the role that disasters can play in providing an opportunity to improve upon institutional and development weaknesses highlighted in the vulnerability section.

While resilience thinking has gained considerable interest over the past few years, there has been some criticism related to transferring an ecological, systems-based concept onto socially, politically and economically constructed contexts. The systems approach typically used to explore resilience has a tendency to ignore power relations in society and views many disaster mitigation and response interventions as neutral processes. This results in a de-politicization of the processes that create vulnerability and risk (Kuhlicke, 2010). Resilience concepts have also been criticized for the failure to acknowledge the downsides of strong levels of resilience in some contexts. For example, the resilience of some social systems, including gangs, dictatorships, and cultural traditions that perpetuate vulnerabilities, may not necessarily result in productive behaviors (Murphy, 2007).

In order to overcome these criticisms, there is a need to incorporate a vulnerability perspective along with resilience. The vulnerability perspective provides an understanding of the social, economic, historical, cultural and political processes that lead to increased risk of disaster events, whereas the resilience perspective explores the opportunities for moving forwards and reducing the impacts of hazards in the post-disaster period. Through the incorporation of resilience, or capacities, individuals and communities are recognized as having capacities on which programs and resources can be built upon (IFRC, 1996). Acknowledging the role of resilience is particularly important for counteracting the tendency to view individuals impacted by a disaster event as ‘helpless victims’ who require the assistance of ‘skilled’ outsiders, particularly in a North (developed countries) to South (developing countries) context. Handmer (2003) suggests that

focusing solely on vulnerability is unnecessarily negative, and suggests that resilience is more appealing when defining households and communities:

We are all vulnerable, but we are also all resilient, and we all have adaptive capacity. Building resilience and capacity is politically appealing and a practical policy response to communities in difficulties – labeling or stigmatizing communities as particularly vulnerable or incapable is not usually politically appealing and is often strongly opposed by the communities involved (Handmer, 2003, p. 60).

Thus, the resilience approach is inherently more empowering as it recognizes the positive characteristics and attributes of individuals and communities that can be drawn upon to help build capacity to cope with future hazardous events. Similar to the important components of vulnerability, the attributes of resilient communities provides guidance for effective strategies to improve recovery operations after disaster events and should be incorporated into a conceptualization of resilient disaster recovery.

2.2.3 Sustainable Livelihoods

As discussed in section 2.2.1, vulnerability to disasters arises out of the social, economic and political context that distributes access to assets and power, as well as exposure to hazards, unequally among different people and different groups. As well, recovery from disaster events requires a shift from short-term relief activities into longer-term development initiatives. Although there is much discussion on defining the meaning associated with the term development (Fordham, 2003), the following research takes a broad approach: development is defined as “an economic, social and political process which results in a cumulative rise in the perceived standard of living for an increasing proportion of the population” (Hodder, 2000, p. 3). Processes of development can act as a major force for change, including increasing modernity and reliance on technology, as well as changing livelihood activities and strategies. As such, development processes, particularly in developing countries, can have serious and direct impacts on hazards and environmental processes as well as vulnerability. Wisner (2003) outlines five common threads that link development and disasters, including:

1. *Governance and democratization*: relates to issues of institutionalized access to resources, democratization of information, and good governance.

2. *Civil society participation*: implementation of both national level priority-setting of development and disaster risk reduction as well as increased participation in community-based natural resource management, hazard mitigation and planning, and livelihood enhancement activities.
3. *Asset building and social protection*: links concepts in both development and disaster risk reduction relating to sustainable livelihoods, social capital and access to resources. Recently, disaster mitigation and prevention activities have increasingly incorporated ‘development’ asset-building processes that “emphasize the importance of social funds, pension arrangements, and other ways in which national resources can be used to spread risk and absorb shocks” (Wisner, 2003, p. 139).
4. *Public health and quality of life*: in the context of both development and risk reduction, health is increasingly viewed as an important element of human dignity, quality of life, capabilities and productivity.
5. *Human rights and conflict management*: as rights-based approaches have been increasingly adopted by aid organizations, the role of political, civil, economic, cultural and even livelihood rights in relation to vulnerabilities has been recognized. The role of conflict in creating and exacerbating vulnerabilities and extreme events has led to these issues being incorporated into disaster risk reduction and development agendas.

McEntire et al. (2002, p. 271) argue that there is a complex relationship between disasters and development, in that “development often promotes disaster, disasters inhibit development, and better development practices are needed to prevent disasters”. The linkages between disasters and development have been increasingly recognized through international declarations and documents such as the Hyogo Framework for Action 2005 – 2015 and various UNDP and UN/ISDR reports (Birkmann, 2006). The linkages between these development and disaster impacts are summarized by Mileti (1999, p. 29) who argues that “not only are disasters more likely to occur where unsustainable development has taken place, but also the occurrence of a disaster itself hinders movement toward sustainability because of its resulting environmental degradation, ecological imbalance, socioeconomic impacts, and lowered quality of life”. As such, disaster research and mitigation efforts are inherently linked to development, as the processes of development can either increase or decrease individual, household and community ability to cope with crisis situations and the overall environmental circumstances in which they live.

The connection between disasters and development has also been acknowledged by many humanitarian organizations working at the ground level. These organizations have found that many recipients of disaster relief and development activities do not make a distinction between

development aid and crisis relief – for them, the process of making a living and maintaining basic living standards involves continually dealing with external shocks and stresses. Wisner (2003, p. 143) argued that the “daily life of many people was a “permanent emergency””, and that disasters could be interpreted as “the extreme situation which is implicit in the everyday condition of the population”. Trujillo, Ordóñez, & Hernández (2000, p. 10) argue that:

Emergencies are not external to the on-going development process, but are part of them. They constitute interruptions or crises which then have major repercussions on the development opportunities of a given community or area. Since disasters always have the potential to undermine development, measures to prevent, prepare for, and mitigate disasters should inform every plan and strategy for sustainable development.

In order to explicitly acknowledge the connections between disasters, recovery and development, the conceptualization of resilient disaster recovery incorporates a sustainable livelihoods perspective.

2.2.3.1 Sustainable Livelihoods Approaches to Development

Increasingly, sustainable livelihoods concepts have been acknowledged as an important component of both development and post-disaster recovery operations. Sustainable livelihoods (SL) is an approach to development that places people, particularly the poor, at the centre of development (Ashley & Carney, 1999). While traditional measures of development focused on increasing levels of consumption, the SL approach measures development and increases in standards of living as “the ability to save and accumulate, to adapt to changes, to meet contingencies, and to enhance long-term productivity” (Chambers, 1987, p. 15). Although interest in sustainable livelihoods approaches increased dramatically as a result of its formal adoption by the UK Department for International Development (DFID) in the late 1990’s, SL concepts originated from participatory approaches to development, and famine and food security research in the 1970’s and 1980’s, indicating its roots are based in hazards and hazard mitigation (Hussein, 2002; Moran, Wright, Renehan, Szava, Rich, & Beard, 2007). In particular, the work of Robert Chambers in the late 1980’s and early 1990’s brought the ideas of sustainable livelihoods to the forefront of development research. Chambers and Conway (1992, p. 6) provide a definition of sustainable livelihoods that has been widely used and adapted by researchers, government institutions and aid organizations, and continues to be used to this day:

A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

Livelihood activities have an impact on the level of exposure to hazardous events through the location of work and home activities (i.e. fishermen who live by the coast are at a higher risk of being vulnerable to storm surge and tsunami hazards), so these activities should be explored in any analysis of hazard risk and vulnerability. Livelihood activities can also have an impact on the environment leading to greater or lesser risk and severity of hazardous events (i.e. Abramowitz (2001) suggests development on hill slopes can increase the risk of landslide events as well as longer-term processes such as soil erosion, and agriculturalists who do not leave appropriate fallow periods between crop seasons can increase the impacts of soil degradation and drought events). These examples provide an indication of the linkages and feedbacks between human interactions with the environment and the impacts of the environment on human activities. Hence, using the sustainable livelihoods approach can provide a link between social, economic and environmental vulnerabilities (Birkmann & Wisner, 2006).

Livelihood strategies and activities also impact the level of income, access to resources and assets that individuals and households can utilize in their response to hazardous events. Thus, particular livelihood strategies, and the associated assets they provide will influence the ability to cope and recover from disasters. As many of the key models of vulnerability (see Blaikie, et al., 1994; Chambers, 1989; Pelling, 2003; Wisner, et al., 2004) view access to and use of resources and assets as a key component of vulnerability, the relationship between vulnerability and livelihoods is important.

Similar to vulnerability, the concept of livelihoods and the sustainable implementation of livelihood strategies have a variety of conceptual frameworks. The approach taken in this research is based on research by the Department for International Development (DFID) in the UK³. Further discussion as to why DFID's approach was selected will be discussed at the end of this section. DFID defines sustainable livelihoods as:

The capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can

³ For a review of the strengths and weaknesses of the various other approaches to understanding sustainable livelihoods, please see Appendix 6.

cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID, 1999, p. 1).

There are six overarching objectives of the sustainable livelihoods approach used by DFID. These including the following:

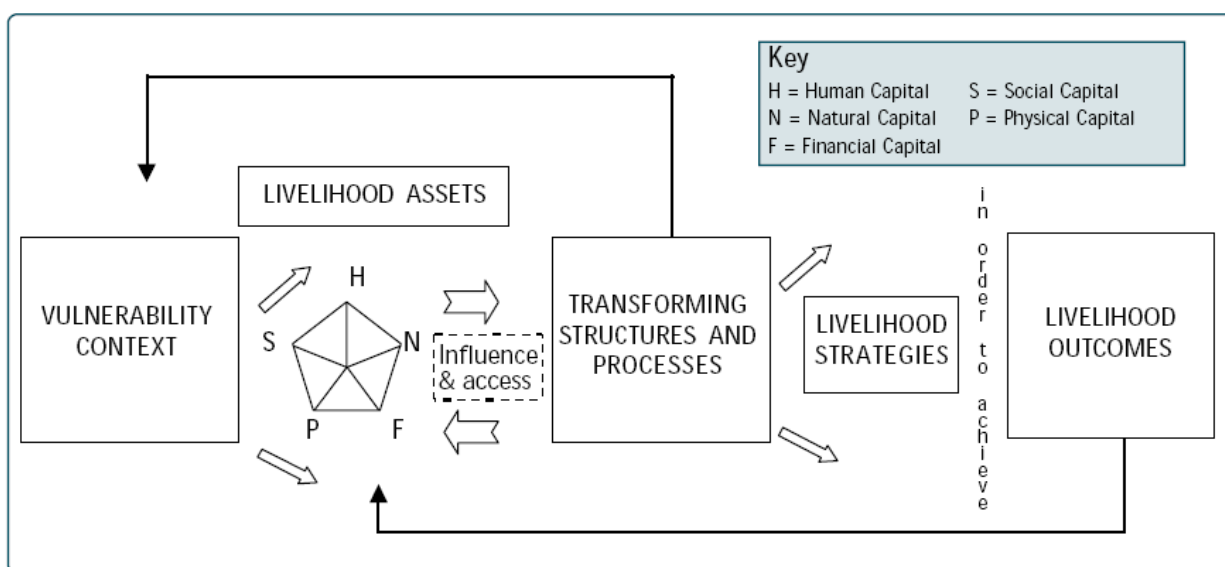
- i) Improved access to high-quality education, information, technologies and training and better nutrition and health;
- ii) A more supportive and cohesive social environment;
- iii) More secure access to, and better management of, natural resources;
- iv) Better access to basic and facilitating infrastructure;
- v) More secure access to financial resources; and
- vi) A policy and institutional environment that support multiple livelihood strategies and promotes equitable access to competitive markets for all (DFID, 1999, p. 3).

These overarching objectives can each be related back to vulnerability and resilience in that meeting each of these objectives would contribute to decreased vulnerability and increased resilience when responding to disaster events. These complementary approaches seek to achieve similar goals through the empowerment of the most vulnerable and increase coping capacity (to disasters and achieving secure and sustainable livelihoods). In order to operationalize the sustainable livelihoods concept, DFID created the Sustainable Livelihoods Framework (SLF), shown in Figure 2.7.

The SLF framework is designed to provide a “checklist of important issues and sketches out the way these link to each other; draws attention to core influences and processes; and emphasizes the multiple interactions between the various factors which affect livelihoods” (DFID, 1999, p. 1). The SLF is a people-centered approach which examines the interactions between vulnerability, various capitals that people may have access to, and the structures and processes that impact livelihood strategies and outcomes. In the model, the ‘Vulnerability Context’ focuses on exposure to shocks, trends and seasonal shifts that have an impact on access to assets and livelihood outcomes. Shocks, in the form of hazardous events, conflicts or economic crisis, can destroy assets and limit the usefulness of livelihood strategies as well as require households to dispose of assets as a survival technique (DFID, 1999). Trends may have a more predictable nature and households and

communities may have adopted certain strategies to adapt to negative trends, although these trends may impact rates of return on selected livelihood activities. Seasonal shifts, which may impact prices, employment opportunities and food availability, represent “one of the greatest and most enduring sources of hardship for poor people in developing countries” (DFID, 1999, p. 3). If hazardous events occur during seasonal periods of hardship, this can severely limit the ability of individuals, households and communities to respond and recover from a disaster event. DFID (1999) argue that changes to the vulnerability context are usually achieved through external activities at the level of ‘Transforming Structures and Processes’ – activities which tend to focus on changes in policy and increased focus on improving the conditions of the poor.

Figure 2.7: DFID's Sustainable Livelihoods Framework (SLF)



Source: (DFID, 1999, p. 1)

From Figure 2.7, the asset pentagon is a core component of the SLF and provides a conceptualization of the inter-relationships between the various forms of capital within the vulnerability context. The centre of the pentagon signifies zero access to assets, while points farther out towards the edge of the pentagon represents increased access. DFID (1999) notes the importance of recognizing the connections between capitals, in that increased or decreased access to one form of capital (i.e. land – natural capital) may increase or decrease access to other capitals (i.e. financial capital is increased through livelihood activities conducted on owned land). Each form of capital from DFID’s sustainable livelihood framework is described in Table 2.3.

Table 2.3: Definitions of Various Forms of Capital

Forms of Capital	Definition
Human	Represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives. At a household level human capital is also a factor of the amount and quality of labour available.
Natural	Term used for the natural resource stocks from which resources flows and services useful for livelihoods are derived. There is a wide variation in the resources that make up natural capital, from intangible public goods such as the atmosphere and biodiversity to divisible assets used directly for production (trees, land etc.).
Financial	Denotes the financial resources that people use to achieve their livelihood objectives, including available stocks (savings in the form of cash, bank deposits or liquid assets) and regular inflows of money (including employment income, pensions, transfers from the state and remittances – in order for these inflows to be regarded as positive, they must be reliable sources of income).
Physical	Comprises the basic infrastructure (changes to the physical environment that help people to meet their basic needs and become more productive) and producer goods (tools and equipment used to function productively) needed to support livelihoods. Essential components include affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean, affordable energy and access to information and communications.
Social	The social resources upon which people draw in pursuit of their livelihood objectives. These are developed through: Networks and connections: either vertical (patron/client) or horizontal (between people with shared interests) that increase people’s trust and ability to work together and expand their access to wider institutions; Membership of more formalized groups: which often entails adherence to mutually-agreed or commonly accepted rules, norms and sanctions; Relationships of trust, reciprocity and exchanges that facilitate cooperation, reduce transaction costs and may provide the basis for informal safety nets.

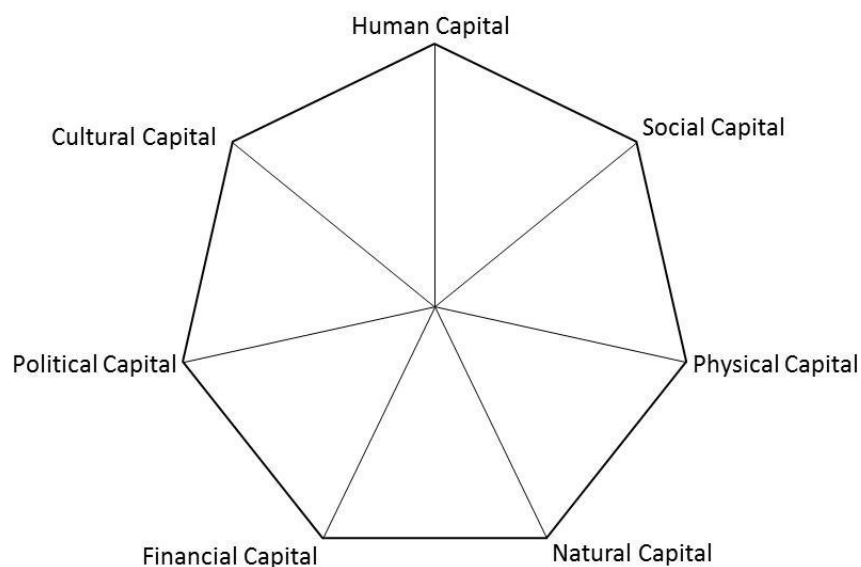
Source: (DFID, 1999, pp. 7-16)

While these five capitals form the basis of the DFID-SLF framework, there has been increasing recognition of the need to acknowledge other forms of capital. Political capital represents a form of power that goes beyond social capital: political capital “refers to the legitimate distribution of rights and power, and how illicit operations of power can frustrate efforts of the poor to access and defend entitlements” (CARE, 2002, p. iv). As political processes and ideologies have been identified as one of the root causes of vulnerability, incorporating a political capital approach explicitly acknowledges the role of access to power and effectively links to vulnerability conceptualizations (Blaikie, et al., 1994; Hewitt, 1997; Pelling, 2003; Wisner, et al., 2004). Through the inclusion of political capital, there is an explicit recognition of rights based

approaches to development and emphasis on identifying root causes of vulnerability (CARE, 2002). In the context of disasters, political capital examines the “ability to influence policy and the processes of government...[and] is important in determining the ability of households and individuals to claim rights to assistance after a disaster” (FAO & ILO, 2009, p. 11). This is indicative of the importance of including political capital in the sustainable livelihoods conceptualization used for the resilient disaster recovery framework.

The DFID-SLF has also been critiqued for excluding cultural capital, regarded as an important element for understanding individual decision-making processes as well as livelihood strategies and outcomes (Snider, 2011; Daskon, 2010). Cultural capital is defined as a “set of attitudes, practices and beliefs that are fundamental to the functioning of different societies” (Throsby, 1999, p. 6) whereby “wealth is created through celebrating and investing in cultural histories, heritage, values, knowledge, traditions, rituals and ideologies of communities” (Daskon, 2010, p. 18). Cultural processes may also have an impact on perceptions of risk and understandings of disaster events: overall this can impact responses and processes of recovery following disaster events (Falk, 2010; Reale, 2010; Schlehe, 1996; White, 2009). As an important factor driving local perceptions of disaster events and appropriate recovery responses, the sustainable livelihoods conceptualization used in this research incorporates cultural capital components. Figure 2.8 provides a revised depiction of the asset heptagon used to conceptualize sustainable livelihoods for the purposes of this research.

Figure 2.8: Sustainable Livelihoods Asset Heptagon



The ‘Transforming Structures and Processes’ component of the SLF examines the small- to large-scale institutions, organizations (both public and private), policies, legislations, customs and power relations that shape livelihoods. These structures and processes impact levels of access, terms of exchange and returns on investment strategies (DFID, 1999). Together, these structures help to shape processes of inclusion and marginalization. DFID (1999, p. 19) notes that current problems with development work revolve around the structures and processes component, arguing that these “do not work to the benefit of the poor. This can be a deliberate outcome driven by the failure of prevailing - elite controlled – governance arrangements to recognize the legitimate interests of the poor...or it can be more accidental, the result of an evolutionary process in which the poor have played little part”. It is through the transforming structures component of the model that the root causes of poverty and deficient livelihood strategies can be examined, whereas the asset pentagon represents the visible manifestations of these root causes.

The ‘Livelihood Strategies’ component of the model examines the variety of activities that individuals and households engage in to meet their livelihood objectives: “it is a dynamic process in which they combine activities to meet their various needs at different times” (DFID, 1999, p. 23). The vulnerability context, access to assets and structures and processes context will influence the choice of livelihood activities available to each individual and household. Due to the complex, dynamic and mobile nature of livelihood activities, these should be viewed within the wider temporal, social and scalar context. ‘Livelihood Outcomes’ represent the achievements or outputs of the ‘Livelihood Strategies’ section (DFID, 1999, p. 23). These outcomes can be further divided into five categories, including increased income levels, increased well-being, reduced vulnerability, improved food security and more sustainable use of the natural resource base. These outcomes may not be mutually compatible and conflict can arise when deciding on the importance of one over the other (i.e. strategies may increase income levels but at the expense of the environment) (DFID, 1999).

While the sustainable livelihoods framework has been implemented in a variety of contexts, particularly through humanitarian organizations, there have been some critiques of the approach. As noted above, DFID’s SL framework does not sufficiently incorporate political and cultural processes (Snider, 2011). This issue has been addressed through the explicit incorporation of political and cultural capitals in the asset heptagon. This allowed for a deeper understanding of the ways in which rights and power, as well as history and culture impact livelihood strategies and

outcomes (Foresti, Ludi & Griffiths, 2007), Criticisms have also been raised over the lack of connection to social and economic theories, whereby the SL approach assumes “the current situation as a given, rather than identifying the events or forces that led to the existing social institutions (Small, 2007, p. 32). This leads to a microeconomic orientation that ignores social differentiation and how social and economic hierarchies contribute to various livelihood strategies and outcomes (Foresti, Ludi & Griffiths, 2007). In order to address this concern, the research incorporated sustainable livelihoods concepts in conjunction with a vulnerability framework that specifically examines root causes and structural processes contributing to reduced access to assets and power.

A further critique revolves around the quantification and economization of the various capital assets. The use of the term ‘capital’ to describe the various sustainable livelihoods assets may imply a household economics approach, whereby assets are described in terms of economic benefits, as opposed to recognizing value in non-financial means (Morse, McNamara & Acholo, 2009). As Scoones (2009, p. 180) notes, the capital approach does not “really deal with the complex intersections of the structural bases of power – in political interests, competing discourses and embedded practices – diminishing such complexity to a lowest common denominator metric”. While the research continues to use the word ‘capital’ to refer to access to the seven assets, it is noted that this interpretation is not necessarily meant to infer an economic value on each asset. Particularly, the research acknowledges that access to certain assets may hold value in non-monetary ways, such as improved spirit, relationships and psychological wellness, as will be noted in Chapter Six.

Although the above criticisms have been noted, DFID’s sustainable livelihoods framework was selected as the conceptualization of SL processes because it provides a holistic approach to development and livelihoods that explores key issues within the context of exposure to various hazards. The SLF offers a conceptualization of sustainable livelihoods that effectively relates back to the definition outlined by Chambers and Conway (1992) and recognizes the importance of incorporating the physical and natural environment. The approach merges particularly well with the conceptual framework of vulnerability outlined by Blaikie, et al.’s (1994) PAR model and Wisner, et al.’s (2004) Access Model. The DFID approach is also inherently dynamic through the recognition of the continually changing nature of livelihoods and the institutions that shape and influence them. By understanding the impact of external shocks and stressors, as well as the

internal processes that impact ability to respond and cope, the sustainable livelihoods framework developed by DFID “calls for ongoing investigation and an effort to uncover the nature of complex, two-way cause and effect relationships and interactive chains of events” (DFID, 1999, p. 6). Furthermore, the asset pentagon (revised to the asset heptagon) provides an opportunity to organize, as well as visually summarize the results of the research (as noted in Chapter Six).

2.2.3.2 Development, Sustainable Livelihoods and Disaster Recovery

Many scholars, NGO’s and governments have recognized the need for longer-term programs to recover from and mitigate against future disaster events (Anderson & Woodrow, 1998; Cannon, Twigg, & Rowell, 2003; McEntire, 1998; Mileti, 1999; Rubin, Saperstein, & Barbee, 1985; Wisner, et al., 2004). Unfortunately, in the face of trying to fulfill immediate basic needs under a critical timeline during and immediately following disaster events, many NGOs are forced to abandon their development goals and the systematic planning and analysis phases found in many development programs are ignored (Anderson & Woodrow, 1998). Through the recognition that the most successful disaster mitigation interventions require long-term commitments and the strategic planning characteristics of development programs, many have argued for the merging of development programs with disaster recovery, preparedness and mitigation initiatives (Anderson & Woodrow, 1998; Cannon, Twigg, & Rowell, 2003).

Incorporating a sustainable livelihoods perspective provides a direct connection between disaster recovery and longer-term development programs (Arnold, 2006; DFID, 1999). In order for development to be sustainable, there is a need to continually address hazards and vulnerability issues. This implies that disaster preparation, mitigation and capacity increasing activities and development programs should be viewed as an interrelated process (Arnold, 2006; Cannon, 2000; Cannon, Twigg, & Rowell, 2003). Through the incorporation of a sustainable livelihoods approach into disaster recovery initiatives, the linkages between these processes are explicitly acknowledged and recognized.

Although SL approaches have been increasingly incorporated into disaster recovery programs, reconstruction and rehabilitation of business and economic activities has been ad hoc in nature and there is a lack of theories and conceptual models guiding reconstruction efforts in this sector (Regnier, et al., 2008). Régnier et al. (2008) also note that experience in livelihood recovery projects has been somewhat limited and successful efforts are highly localized in nature. In the

context of achieving resilient disaster recovery, the lack of conceptual and theoretical guidance in planning reconstruction activities, particularly in relation to livelihood strategies and building resilience, presents a challenge. Incorporating an SL framework with vulnerability and resilience concepts provides an opportunity to build conceptual and theoretical guidance for livelihood reconstruction initiatives. The linkages and connections between these three concepts will be discussed further in the conceptual framework outlined in chapter three.

2.3 Summary and Conclusion

As explored in the more recent recovery literature, vulnerability reduction forms a central component of effective reconstruction and rehabilitation from disaster events as vulnerable groups may be more susceptible to losses and experience more difficulty during recovery (Brown, et al., 2008; Wisner, et al., 2004). From the understanding of vulnerability presented in the previous section, the hazard is viewed as the triggering event, but disasters are created when pre-existing vulnerabilities interact with the hazard. Thus, any resilient disaster recovery and reconstruction efforts need to focus on reducing pre-existing vulnerabilities.

Improving upon the pre-disaster conditions of affected communities should also focus on improving resiliencies and adaptive capacities of individuals and communities. Particularly in contexts where disaster recovery is organized and implemented by international humanitarian organizations, a focus on resilience can help to ensure that both newly established and pre-existing local governance capacities, as well as local customs and capitals, are perpetuated and enhanced (Ride & Bretherton, 2011). This approach focuses on maintaining sustainability of recovery operations, particularly after humanitarian organizations have suspended their recovery activities.

Furthermore, incorporating a sustainable livelihoods approach helps to incorporate a longer-term perspective on disaster recovery and focuses on achieving enduring social and economic sustainability of development interventions. In this sense, the goal is to effectively use livelihood interventions in order to achieve vulnerability reduction and resilience building activities. Thus, sustainable livelihoods approaches provide an effective triangulation between concepts of vulnerability, resilience and long-term development in order to achieve improvements of the everyday living conditions of impacted populations.

In conclusion, chapter two has summarized how concepts of vulnerability, resilience and sustainable livelihoods can be incorporated into a resilient disaster recovery framework useful for

assessing long-term disaster recovery and contribute to further understanding of recovery processes. In order to provide a more explicit understanding of how these concepts will be integrated as a conceptual framework for achieving the goals of this research, the following chapter outlines the research framework and the methodology for conducting the research. Further discussion of how each of these concepts formed an integral part of the assessment framework will be discussed in chapter seven based on the results of conducting the research.

3.0 RESEARCH METHODS

The research integrated the concepts of vulnerability, resilience and sustainable livelihoods in order to conceptualize resilient disaster recovery as well as develop a framework for assessing long-term recovery initiatives. Chapter three provides an overview of the initial research framework, outlining the conceptual approach used throughout the research process. The chapter also highlights how data were collected and analyzed, as well as providing an overview of the challenges and limitations of the research.

3.1 Research Framework

Researchers and aid organizations alike have identified the need for a systematic, independent and replicable framework and approach for monitoring, evaluating and measuring the longer-term relief and recovery operations of major disaster events (Brown, et al., 2008). As vulnerability, resilience, and sustainable livelihoods have been increasingly incorporated into disaster recovery theory and planning, an evaluation approach which integrates all three concepts will provide a unique opportunity to critically analyze post-disaster recovery operations. The following sections outline the conceptual framework as well as the methodological approaches typically used to guide assessments of these concepts.

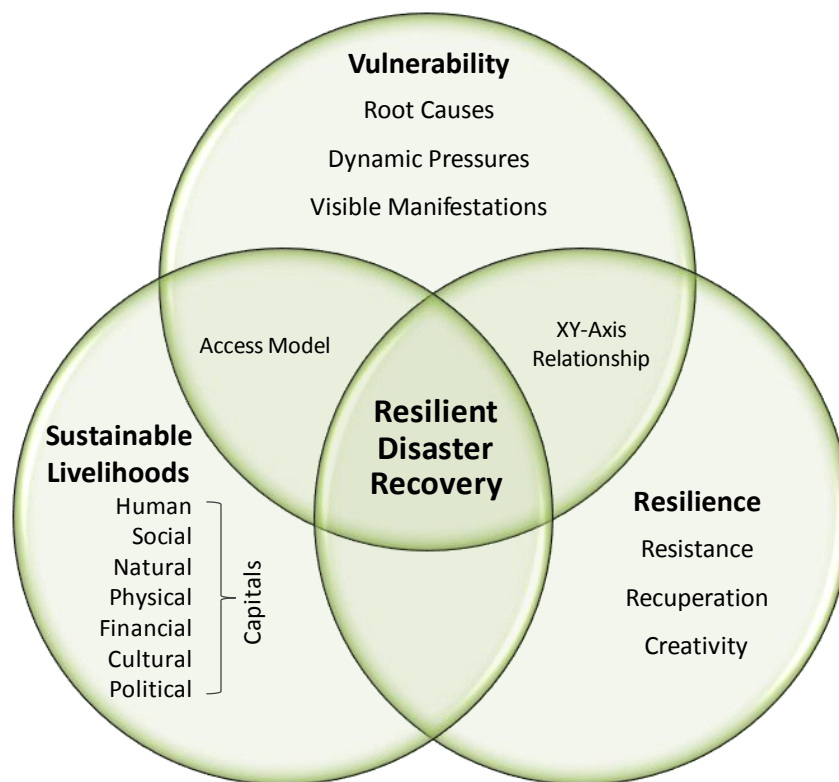
3.1.1 Resilient Disaster Recovery Assessment Framework

The initial version of the Resilient Disaster Recovery Assessment Framework (RDR-AF) shown in Figure 3.1 depicts the conceptual model used to guide the evaluative process, which will be further refined and modified based on the research results. Through the use of a conceptual framework that incorporates the key issues addressed in the vulnerability, resilience and sustainable livelihoods literature, there is an opportunity to implement a transdisciplinary approach. The transdisciplinary approach is useful for research designed to explore the complexity of real-world problems that transcend traditional disciplinary boundaries (Benjamin, 2009; Pohl & Hirsch Hadorn, 2009). Through the integration of concepts from a variety of disciplinary paradigms (e.g. development, hazards, social-ecological resilience), the research expands outside of traditional discipline boundaries in order to: “grasp the complexity of the problems, to take into account the diversity of scientific and societal views of the problems, to link abstract and case specific knowledge, and to constitute knowledge with a focus on problem-solving for what is perceived to be the common good” (Hadorn et al., 2008, p. 19). This approach is particularly useful in the

context of long-term disaster recovery, whereby there is a variety of actors, stakeholders and programming implemented from a variety of sectors and perspectives.

The RDR-AF provided a method for holistically evaluating whether the recovery effort has achieved resilient disaster recovery, increased capacity to cope with future events, and addressed some of the underlying root causes of vulnerability. The RDR-AF explicitly implies that in order for recovery efforts to be defined as successful, there is a need to address all three concepts. As well, the holistic nature of these three concepts will help to determine how the recovery process impacted local conditions and potentially reduced the risk of future disasters. The model presents a multi-scalar approach to conceptualizing and evaluating disaster recovery: the various scales of vulnerability, resilience and sustainable livelihoods processes are recognized through the understanding of each concept, as discussed in chapter two.

Figure 3.1: Resilient Disaster Recovery Assessment Framework



In the resilient disaster recovery framework, the three bodies of literature discussed in chapter two are brought together, with the relationships between the concepts highlighted. Resilience is

conceptualized along the three dimensions discussed in chapter two, including resistance, recuperation and creativity. Using this three-pronged approach provided a holistic understanding of the different components that make households and communities resilient and provides a linkage between different definitions of resilience, as well as concepts of coping capacity and adaptive capacity. This understanding of resilience also integrates a temporal and dynamic approach, focusing on both pre- and post-disaster conditions, as well as long term changes. This effectively links to longer-term development initiatives and ties into the idea ‘building back better’ through a focus on change, transformation and learning. The relationship between resilience and vulnerability is captured by the X-Y axis model depicted in Figure 2.6 and outlined in the literature review. Vulnerability is conceptualized through the Pressure-and-Release (PAR) model developed by Blaikie, et al. (1994) and Wisner, et al. (2004). The PAR model examines vulnerability using a political ecology approach that explores how larger-scale social, political and economic decisions and processes interact with the environmental processes linked to hazardous events. Political ecology approaches operate under three main assumptions:

1. The costs and benefits associated with environmental processes are for the most part distributed among actors unequally;
2. An unequal distribution of environmental costs and benefits works to either reinforce or reduce existing social and economic inequalities. This emphasizes that environmental and developmental processes are inherently linked, and;
3. The differentiated social and economic impact of environmental processes has political implications in terms of the altered power of actors in relation to other actors. Consequently, environmental changes may result in wealth creation for some and impoverishment for others, and also alters the ability of actors to control or resist other actors (Bryant & Bailey, 1997, pp. 27-28).

The PAR model effectively links to the ‘Access’ model, focusing on the role of livelihoods and how livelihoods are influenced by both structure and agency. The PAR and Access models were chosen as the conceptual framework for understanding vulnerability due to the explicit focus on place and exploring root causes of vulnerability, the acknowledgement of the role of recovery and reconstruction processes in perpetuating or reducing vulnerability and the incorporation of both structure and agency. The PAR and Access models also provide a multi-scalar bridge across large and small scales of focus, with the PAR focusing on the larger scale social, economic and political structural processes and the Access model focusing on more localized, individual decision-making

processes. Using the PAR and Access models as a framework for exploring disaster recovery efforts provides a conceptual link between vulnerability and sustainable livelihoods (SL) theories and models. While early work on sustainable livelihoods acknowledged the importance of security in the face of shocks and stresses, more recent work has recognized the value of explicitly linking vulnerability and sustainable livelihoods concepts (see the work of Birkmann & Fernando, 2008; Cannon, Twigg, & Rowell, 2003; Lautze & Raven-Roberts, 2006; Pomeroy, Ratner, Hall, Pimoljinda, & Vivekanandan, 2006; Regnier, et al., 2008).

Sustainable livelihoods is conceptualized through the Department for International Development's (DFID) Sustainable Livelihoods Framework (SLF), specifically through the asset pentagon, with the addition of political and cultural capital. The SLF was selected due to the explicit recognition of the interactions between vulnerability, various capitals that people may have access to and the structures and processes that impact livelihood strategies and outcomes (DFID, 1999). The asset heptagon, representing social, natural, physical, human, financial, political and cultural capitals, provides a conceptualization of the inter-relationships between the various forms of capital within the vulnerability context. The asset heptagon also provides a method for structuring and organizing the research results in Chapter Six. Unfortunately, in the current state, the SLF, PAR and Access models do not effectively conceptualize resilience or coping/adaptive capacities and there is limited information on the relationship between these processes, particularly resilience and sustainable livelihoods. This research will attempt to fill a gap in the literature through the synthesizing of these models and furthering knowledge on the relationships between these concepts, particularly in the context of disaster recovery.

The RDR-AF offers a unique approach for evaluating long-term disaster recovery operations that differs from the type of approaches outlined in the humanitarian impact literature. Humanitarian assistance evaluation tools have generally been developed to assess the impacts of specific programs (Hofmann, 2004), emphasize evaluation in conjunction with program objectives (Beck, 2009), focus on net changes in outcomes (3ie, 2008), identify measurable outputs (ALNAP, 2006), and compare those receiving assistance to a control group that did not receive assistance⁴ (Buttenheim, 2010). From this perspective, any net positive change or differences would then be used to define the effectiveness of recovery interventions. On the other hand, the RDR-AF

⁴ The challenges of identifying a non-biased counterfactual have been identified, including the ethical considerations of withholding assistance to form a control group, the spillover effects of assistance may expose the counterfactual, and differences between beneficiary groups may lead to differences in outcomes (Buttenheim, 2010).

approach begins the assessment by conceptualizing resilient disaster recovery, thereby defining what successful recovery looks like, through the concepts of vulnerability, resilience and sustainable livelihoods. In this sense, the RDR-AF approach compares those receiving assistance to an idealized conceptualization of what post-disaster interventions could achieve⁵. Although both approaches seek to compare post-recovery conditions to baseline data established prior to the earthquake, the RDR-AF approach goes further to provide a holistic assessment of recovery efforts, as opposed to specific programs, and seeks to identify ongoing vulnerability conditions and livelihood issues, while still maintaining a focus on resiliencies and capacities. Thus, the RDR-AF provides a conceptual approach to assessing recovery programming; the effectiveness of this type of approach will be further discussed in chapter seven.

3.1.2 Methodological Approaches

While the RDR-AF provides a conceptualization of effective disaster recovery, the approaches used for data collection should also be outlined. As long-term, holistic disaster recovery assessments have been relatively rare, the following section draws on vulnerability, resilience and sustainable livelihoods assessment methods outlined in each respective literature. Within the vulnerability, resilience and sustainable livelihoods literature, there are an abundance of tools that can be used to assess these concepts: these tools provide direction regarding the criteria that should be examined, methods for collecting data, as well as systems for organizing and displaying data. The variety of approaches highlights the different ways that various organizations have assessed vulnerability, resilience and sustainable livelihoods, and are a reflection of the different conceptualizations discussed in chapter two.

Although it is beyond the scope of this dissertation to provide a detailed overview of vulnerability, resilience and sustainable livelihoods methodologies, a summary of guidelines for data collection was derived from a review of selected tools developed by a variety of agencies. Appendix 7 provides an overview of selected vulnerability, resilience and sustainable livelihoods tools. From this review, several important elements were identified to guide the data collection methods of this research. These contributions include:

⁵ This conceptual approach is based on a three key assumptions, the first assumption is that the budget would exist in order to implement long-term programming. The second assumption is that governments, NGOs and impacted communities have an unlimited timeframe in which to make adjustments. Finally, the approach assumes that impacted communities are willing and interested in change.

1. Incorporating qualitative and participatory research methods that acknowledge the value of local knowledge and strategies;
2. Placing vulnerability, resilience and sustainable livelihoods issues within the context of development initiatives occurring in the area;
3. Developing an approach which is broad in nature and flexible enough to recognize the unique characteristics of each place, while at the same time providing information on indicators/guidelines for assessment, and;
4. Examining vulnerability, resilience and sustainable livelihoods at a variety of scales to incorporate a review of both localized and larger-scale processes.

In order to assess long-term recovery initiatives, the selection of variables used to explore concepts of vulnerability, resilience and sustainable livelihoods needs to be grounded within a conceptual framework (Birkmann, 2007), in this case the RDR-AF model. In order to guide the research process and survey/questionnaire instrument, a review of the literature garnered some of the key elements/factors/attributes that should be analyzed for each of the three concepts. Table 3.1 outlines how the various factors affecting vulnerability and resilience were explored under a sustainable livelihoods framework. Merging concepts of vulnerability, resilience and sustainable livelihoods creates a matrix, whereby vulnerability and resilience concepts are explored under the asset heptagon derived from DFID’s SL framework. The matrix depicted in Table 3.1 was used as a guideline to develop the survey/questionnaire instruments as well as organizing the data results in chapter six. The research explored these factors from a process approach, focusing on how issues associated with each attribute changed over time, particularly emphasizing changes that were a result of post-disaster recovery programming.

Table 3.1: Attributes Influencing Sustainable Livelihoods, Resilience and Vulnerability

Sustainable Livelihoods	Vulnerability	Resilience
Human Capital	Access to and levels of education Household structure (age, gender) Quality/access to health services Disability Language skills Attitudes/perception towards hazards	Experience/knowledge of hazards Health levels – ability to labour Variety of livelihood options Self-efficacy/coping style Local knowledge
Social Capital	Informal/formal networks Networks outside community Social isolation/marginalization	Use of networks during recovery Ability to access external help
Physical Capital	Shelter (rent/own/quality) Access to infrastructure and lifelines Rural/urban environments Population density	Access to tools for livelihoods Access to transportation/mobility Access to communications

Financial Capital	Poverty/inequality Level of savings (cash/assets) Unemployment	Access to loans/credit Security of income Local economy strength Diversity of livelihoods/economy Risk dispersion
Natural Capital	Physical landscape features Geographical exposure to hazards Climate change issues	Access to natural resources for livelihood options Resource sustainability Biodiversity
Political Capital	Decision-making structures Strength of social programming Corruption Lack of cooperation Political ideologies	Levels of awareness/preparedness Education/training opportunities Reaction times Quality/strength of local leadership Funding for DRR activities Institutional partnerships Accountability of governments/organizations
Cultural Capital	Cultural beliefs limiting disaster preparedness	Beliefs/customs enhancing resilience (Gotong Royong) Sense of community Individual/community values/attitudes

Sources: (Adger, 2006; Adger, Brooks, Bentham, Agnew, & Eriksen, 2004; Birkmann, 2007; Birkmann & Wisner, 2006; Blaikie, et al., 1994; Brooks, Adger, & Kelly, 2005; Buckle, 1998; Buckle, 2001/2002; Buckle, Mars, & Smale, 2000; DFID, 1999; Fuchs, 2009; King, 2001; King & MacGregor, 2000; Paton, Millar, & Johnston, 2001; Pelling, 2003; Rygel, O'Sullivan, & Yarnal, 2006; Turvey, 2007; Wisner, et al., 2004; Yan & Xu, 2010; Yohe & Tol, 2002)

For certain attributes, there was difficulty distinguishing an attribute as only a vulnerability or resilience characteristic. In some cases, attributes could be expressed as both a characteristic of vulnerability and resilience. In other cases, attributes had the potential to act as a vulnerability in certain contexts and a resilient characteristic in other contexts. This presented difficulties in classifying attributes in either the vulnerability or resilience column. As both concepts were explored in this research, the matrix is intended to demonstrate the range of issues to be considered and not necessarily to depict a clear delineation of vulnerability and resilience factors nor to suggest cause and effect relationship among the concepts. The complexity of the inter-relationship between vulnerability and resilience is discussed further in chapter seven.

3.2 Data Collection

As noted in chapter one, the objectives of the research were to develop a refined conceptualization of resilient disaster recovery, empirically test the RDR-AF approach as an evaluative framework in a post-disaster setting, and provide empirical evidence regarding one long-term recovery effort. In order to achieve these goals, the research made use of a variety of data collection and analysis methods: the following section provides an overview of these methods. In order to apply the RDR-AF, a case study approach was employed. The 2006 Yogyakarta earthquake and subsequent recovery effort served as the overall 'case' used to examine and evaluate the disaster recovery

process, and a series of embedded cases (i.e. multiple impacted villages) were used to draw out the depth and breadth of the post-disaster experience. A total of five villages were selected for inclusion in the research: an overview of the case study site and selected villages is provided in chapters four and five, respectively.

The case study approach was selected as it “contributes uniquely to our knowledge of individual, organization, social, and political phenomena” (Yin, 2003, p. 2). This provides an ideal opportunity to explore the interactions between various small- and large-scale social, economic, political and environmental processes that create disaster events and influence disaster recovery. The case study method is a place-based approach that provides an inherently geographic focus: assessment focuses on “discrete ecosystems, groups, or places where the risks are better understood, and can be more easily traced to pertinent processes” and the “coupled social-ecological interactions...produce more meaningful, detailed, and policy-relevant insights” (Barnett, Lambert, & Fry, 2008, p. 105; 115). As a consequence, local vulnerabilities, resiliencies and livelihood strategies can be placed within the context of larger-scale social, economic, political and institutional processes (Fuchs, 2009). Case study approaches are also useful for developing new theories and conceptual frameworks, particularly in areas where the phenomenon is underexplored and under-theorized (Baxter, 2010). This is particularly relevant in the context of long-term disaster recovery, where in-depth research and the development of theory has been limited (Barton, 1969; Lloyd-Jones, 2006; Rubin, Saperstein, & Barbee, 1985; Schwab, 1998).

As one of the main objectives of the research was to explore long-term resilient disaster recovery as a process, the principal tools for collecting data were qualitative in nature. Qualitative research focuses on understanding “the social world through an examination of the interpretation of that world by its participants” (Bryman, 2001, p. 264). In this manner, qualitative approaches attempt to “make sense of, or interpret, phenomena in terms of the meanings people bring to them” (Denzin & Lincoln, 2005, p. 3). Qualitative approaches allow the researcher to examine both the structures that impact individual and group behavior, as well as individuals’ experiences of places and events (Winchester & Rofe, 2010). Thus qualitative approaches are uniquely suited to examine the structural and agency processes highlighted in the research framework previously described.

A variety of qualitative approaches were used during the research process, including household interviews (n=128), focus group discussions (n=5), interviews with government officials, NGO practitioners and academics (n=17), and ethnographic observation and secondary data collection.

The following sections provide an overview of each of these methods, the process of participant selection, and data collection methods. This is followed by a brief discussion of the use of research assistants who facilitated the research process.

3.2.1 Household Interviews

The interview is the one of the most common research methods used in qualitative research (Warren & Karner, 2010). Interviews can take a range of forms: structured - where the interview process is question-focused and all participants are asked the same questions in the same order; semi-structured - where interview questions are used as a guide and follow-up questions are content-focused and deal with issues judged to be relevant to the research questions; or unstructured - where the interview is interviewee-focused, and highlights personal perceptions and histories (Hay, 2010, pp. 109 - 111). In-depth interviews offer an opportunity to go beyond aggregated data and acquire a deeper understanding of complex behaviors, motivations and decisions of the individuals and communities under study (Dunn, 2010). Interviews are also an appropriate method for providing information about events, opinions and experiences and how these may vary among different groups (Dunn, 2010). Particularly in the context of post-disaster recovery, the interview method allows the impacted population to share their thoughts and opinions on the recovery process and the programs implemented by both domestic and foreign organizations. This makes interviews, and more specifically household interviews, an appropriate method for examining the in-depth experiences of households and communities impacted by the earthquake event and the subsequent recovery effort.

Between 24 and 27 semi-structured household interviews were conducted in each village (ranges varied due to interviews that had to be discarded due to validity issues, as well as extra interviews that were conducted in some villages), focusing on individuals and households that were directly impacted by the earthquake event. Household interviews occurred over a five-month period (from mid-January 2011 until mid-June 2011), approximately five years following the earthquake disaster. Although the household interviews took place over a five-month period, the researcher was involved in community meetings and visits with leaders and households in each village for a seven-month period from early December 2010 until the beginning of July 2011. Each interview was approximately one hour in length, although this ranged from 20 minutes to over two hours, depending on the responses of the interviewee.

The purpose of these interviews was to provide demographic information (i.e. household size, economic activities, income levels, etc.) as well as information on their recovery experience, daily living conditions and ongoing characteristics of vulnerability and resilience. These semi-structured interviews followed a standard question format focusing on recovery, livelihood, vulnerability and resilience issues derived from Figure 3.1. Follow-up questions were designed to provide a flexible structure that allowed the interviewer to probe or prompt for further details or to further discussion on relevant topics (Dunn, 2010; Warren & Karner, 2010). Appendix 2 provides an overview of the interview guide used for the household interviews.

In most cases, interviews were conducted in Bahasa Indonesian language, although some interviews were conducted in Javanese. Issues associated with the use of language are further discussed in section 3.4. Interview responses were either translated to the researcher during the interview and notes were taken in English, or were translated by the research assistants at a later date (in this case the research assistants made notes in both English and Indonesian). Interviews that were translated at a later date were then reviewed together with the researcher and any clarifications or additional information was added in. Throughout this dissertation, household interview citations are referred to with the 'HI' prefix. Please see Appendix 1 for a complete list of interview dates, language used and associated interview numbering collected in each village.

Individuals and households were selected to complete interviews based on purposive, non-random sampling techniques, whereby pre-identified individuals and groups of individuals were targeted based on discussions from the vulnerability, sustainable livelihoods and disaster recovery literature (i.e. including various actors and strata of the community, such as wealthier, more politically powerful members of the community, community leaders, as well as the more vulnerable groups, such as those with low income, those living in high-risk locations, female-headed households, those with lower levels of education etc). Table 3.2 highlights the variety of households that were targeted in each village.

In all villages, discussions were held with the head of the village regarding the requirements for research participants, and the researcher was provided a list of community leaders and potential households to be interviewed. A representative from the village was hired to accompany the researcher and assistants to the various households, as well as to introduce the research team on behalf of the village government. Additional participants not on the original lists were solicited by the researcher and research assistants by walking through the village and highlighting households

that fit into the desired categories (i.e. wealthier homes, poorer households, female respondents, households that were marginalized in some aspect). Fortunately, the response rate for the household interviews was 100%, with no households declining to participate in the study. Most households seemed eager to participate and welcome the researcher into their homes, almost always providing tea and refreshments, as well as providing tours of their homes and pointing out features of the buildings and land that were impacted by the earthquake and subsequent recovery efforts.

Table 3.2: Household Interview Matrix

Village:	Puton	Kategan	Wonokromo	Ngandong	Sengon	Total
N =	25	24	27	25	27	128
GENDER:						
Male	15	12	14	15	11	67
Female	10	12	13	10	16	61
AGE:						
20 - 29	1	0	2	1	3	7
30 - 39	5	5	7	5	5	27
40 - 49	7	11	7	10	8	43
50 - 59	9	6	4	6	3	28
60+	3	1	6	3	5	18
EDUCATION:						
Never attended	2	1	0	5	0	8
Elementary	11	13	2	5	1	32
Junior High	4	6	6	8	13	37
High School	5	4	6	6	12	33
Diploma	1	0	5	0	1	7
University	0	0	5	1	0	6

In lieu of providing compensation or gifts to households that participated in the research, the decision was made (based on recommendations from Indonesian academic partners as well as community leaders) to provide an overall donation to each community. Examples of community donations are highlighted in Figure 3.2.

The use of one large community donation ensured that all community members would be able to ‘participate in’ or ‘use’ the donated goods in order to reduce the potential for conflicts over participating in the research. In-kind donations or events were provided to each community based on the wants and needs of each particular village. In one village, the researcher funded and attended a community dancing event, with *Jetilan* dancers performing for the community, whereas another village received a playground set for their pre-school program. Other donations included

books for the public elementary schools in the village, funds to purchase chili plants for all households, and t-shirts for all government employees to be worn during exercise and *gotong royong* activities (refer to Figure 3.2). Each village donation cost approximately \$200 CAD, resulting in a total donation cost of \$1,000 CAD.

Figure 3.2: Examples of Community Donations



a) Jertilan dancers performing for the village



b) Playset donated for village preschool program



c) T-shirt donation for all government employees



d) Disaster educational and preschool materials

Interview data was collected in order to respond to the research questions outlined in the first chapter. The interviews were used to: provide information on local stakeholder perceptions of the recovery effort; provide insight into the relationship between vulnerability, resilience and sustainable livelihoods during the recovery period; providing a basis for assessing the overall effectiveness of the recovery effort, and; informing the conceptualization of resilient disaster recovery.

3.2.2 *Focus Groups*

Focus group discussions involve engaging a small group of participants (usually in the range of 4 - 10 people) in a semi-structured dialogue focused around a particular topic (Bryman, 2001; Wilkinson, 2004). Focus groups can be useful for providing in-depth information on collective responses to events that go beyond what can be provided by individual interviews (Warren & Karner, 2010). Cameron (2010, p. 156) notes that focus group discussions can be particularly useful for “investigating not just *what* people think and do but *why* people think and behave as they do...[thereby providing an] understanding of people’s beliefs and practices”. While the focus group is intended to provide further information to supplement and interpret the ideas and opinions expressed by the household interview respondents, it also provides an opportunity for “people to explore different points of view and to formulate and reconsider their own ideas and understandings” (Cameron, 2010, p. 154). Focus group discussions may provide the opportunity for respondents to share their thoughts and opinions in a more naturalistic environment, engaging in dialogue and communication processes with friends and community members that may include informal components such as storytelling, joking, teasing, and disagreement (Wilkinson, 2004). This indicates that focus groups are particularly well-suited for exploring some of the underlying components of the overall community response and recovery effort in the post-disaster context.

One focus group discussion was held in each village site, resulting in a total of five focus groups. Focus group discussions were held at the completion of the household interviews in order to ensure that the researcher had enough information regarding the overall recovery experience of each particular village. Questions focused on issues of vulnerability in the community, as well as resiliencies and livelihood strategies that could be employed to mitigate these vulnerabilities. Thus, although a focus group guideline was provided for the focus group discussions (refer to Appendix 3) it was necessary to slightly revise the questions for each village in order to ensure relevancy of the questions asked. The focus group discussions were conducted in Bahasa Indonesian, and two research assistants were employed for the discussion. One female assistant was responsible for conducting the discussion in a culturally appropriate manner, as well as one male assistant who took notes and translated the discussion for the researcher. This allowed the researcher to directly ask questions during the discussion based on comments and responses from the participants. The researcher took notes in English during the focus group discussions based on the translations

provided, and follow-up discussions with both research assistants provided further insights into the comments and responses made by the participants.

The focus group participants were selected based on recommendations from the village leader, as well as recommendations from the research assistants based on the responses in the household interviews. In the context of Indonesian village structure, different types of village leaders were selected for inclusion, including neighbourhood leaders, as well as leaders of social and religious organizations. In order to reduce social conflict and ‘loss of face’, in many cases it was necessary to invite a large number of participants, although not all invitees were able to attend. Thus, the focus groups ranged in size, with one village having seven participants, one village having eleven participants, and the remaining three villages each having nine participants. Throughout this dissertation, focus group discussions are referred to with the ‘FG’ prefix. Please see Appendix 1 for a list of focus group participant numbers, dates and locations.

The data obtained from these focus groups was used in conjunction with the household interview data to understand the overall recovery effort within the context of each village. While the household interviews provided valuable information about the recovery experiences of the individual household, the focus group discussions focused on aspects of vulnerability, resilience and sustainable livelihoods from a community perspective. The larger-scale perspective contributed to the multi-scalar approach set forth in the evaluation framework, and allowed for a more holistic understanding of the issues and recovery processes in each village. This provided further information to support the assessment of the recovery effort as well as inform the conceptualization of resilient disaster recovery.

3.2.3 *Expert Interviews*

In-depth semi-structured interviews (n = 17, see Table 3.3) were also conducted with various stakeholders and representatives from government, academic and humanitarian organizations in order to more fully understand the recovery and reconstruction process (refer to Appendix 4 for the expert interview guideline). Government and humanitarian interviews were able to provide specific information on decisions that were made during the recovery process, as well as how external factors (such as government bureaucracy, funding constraints, donor requirements, etc.) played a role in the decision-making process. Particularly for the academic and humanitarian interviews, respondents were able to place the Yogyakarta recovery effort within the wider context of

development and humanitarian aid, both in Indonesia as well as globally. As a result, the expert interviews provided valuable information regarding some of the larger scale processes that could be linked to the experiences and current conditions in each village.

Expert interviews targeted government officials at multiple levels within Yogyakarta and Central Java province, academic institutions in Yogyakarta, as well as aid organizations and humanitarian practitioners still located in the region. Expert interviews included representatives from various humanitarian organizations, including the United Nations, the Java Reconstruction Fund, Oxfam, Cordaid, the International Organization for Migration (IOM), and Arbeiter-Samariter-Bund (ASB). Due to the confidential nature of the interviews, further subdivision or discussion of responses in relation to specific organizations is not provided. Expert interviews are referred to throughout this dissertation with an ‘E’ prefix and a full listing of expert interviewees is provided in Appendix 1.

Table 3.3: Expert Interviewee Matrix

Organization	Number of Interviews
Non-Governmental Humanitarian Organizations	7
Academic Institutions	5
Government Officials	5

Almost all of the expert interviews were conducted by the researcher in English, although one of the government official interviews was conducted in Bahasa Indonesian and required the use of a translator. Potential interviewees were selected through personal contacts at Gadjah Mada University and the Islamic University of Indonesia, as well as humanitarian organizations. These interviewees then provided recommendations and contact information for further expert interview participants in the study, a process known as ‘snowball sampling’. Almost all the interviews were conducted in person, although two interviews were conducted over the telephone due to the fact that the interviewees were now working in other locations (although they were involved in the recovery effort in Yogyakarta). All expert interviews were recorded and transcribed verbatim (excluding the interview conducted in Bahasa Indonesian). In some of the interviews, particularly with the government officials, there was more than one representative attending the interview, and at times, sharing information. This would still be highlighted as one interview, as there was always a key person who responded to the majority of the questions.

As noted above, the expert interviews provided ‘higher-order’ information on the recovery effort, highlighting the larger-scale processes that impacted the overall recovery effort. This provided

important information to assess the overall recovery effort, as well as to contribute to the conceptualization of resilient disaster recovery.

3.2.4 Other Data Collection Methods

While the household interviews, focus group discussions and expert interviews represent the majority of data collected to conduct the research, ethnographic observations and collection of secondary data sources also contributed information regarding the overall recovery effort. Direct ethnographic observation was used as an ongoing research method to “provide a rounded account of the lives of particular people” and to contribute to an overall understanding of the people and culture of Yogyakarta, as well as the recovery experience after the earthquake (Angrosino, 2005, p. 741). The researcher spent extended periods of time in the selected villages, attending social events (such as soccer matches, *gotong royong* and *posyandu*⁶ activities, visits with villagers etc.), academic and government events, as well as multiple tours and walkabouts through each village. These observations and informal discussions provided a deeper understanding of the daily living conditions and cultural context of village life in the region, as well as a deeper appreciation of the issues and recovery processes that occurred after the earthquake event. These observations were recorded through field notes, journal entries and photos. In conjunction with direct observations, informal discussions were held with villagers, community leaders, research assistants, academics, as well as various individuals throughout Yogyakarta. Information obtained from these informal discussions is referred to with a ‘CM’ prefix in this dissertation. All together, these informal discussions provided valuable sources of information for the researcher.

Finally, secondary data collection was used to provide further information on the specifics of the recovery effort, as well as outline any previous research that had been conducted in the region. During each expert interview, respondents were asked whether they had access to any documents, reports or evaluations that might be valuable to the research. Many of the humanitarian organizations provided copies of their annual reports and internal assessments. Academics at Gadjah Mada University provided access to their resources and facilities, allowing the researcher access to a variety of materials and documents to support the study. These documents were useful for placing the recovery experiences of each of the village sites within the context of the larger-

⁶ *Gotong royong* refers to collective activities conducted at the village level. *Posyandu* refers to community health activities organized by the women’s community in each village. These terms are further discussed in Chapters 5 and 6.

scale recovery effort, as well as providing quantitative information on reconstruction and recovery programs.

3.2.5 *Research Assistants*

Employing research assistants throughout the data collection process was a necessity: the researcher did not have the Indonesian or Javanese language skills to conduct the interviews, nor a firm understanding of the cultural and linguistic subtleties that might underlie participant responses. The importance of employing competent and skilled research assistants to conduct and translate the household interviews and focus groups cannot be overemphasized: research has indicated that language has an influence on how people see and think about various phenomena, resulting in significant impacts on worldviews and understandings of particular events (Boroditsky, 2010; Sapir, 1951; Whorf, 1956). Language is the primary means of reflecting social and cultural practices, and as such, the research assistant plays the role of a cultural mediator between the researcher and the research participants (Steger, 2004). Language also plays a significant role in terms of how meaning is constructed, and how specific phenomena or events are interpreted and expressed (Howitt & Stevens, 2010). As a consequence, effective research assistants act not only as a translator of language, but of meaning, social customs, and cultural perspectives.

Research assistants were hired through recommendations from Yogyakarta-based academic partners at both Gadjah Mada University and the Islamic University of Indonesia (UII). In the initial phase, two research assistants were hired (one male and one female) in order to facilitate the selection of village sites, pilot test the interview and focus group questions, as well as begin the process of household interviewing. The experience and connections of the female research assistant led to her taking on a role which was primarily to connect to potential village sites, arrange meetings with community leaders following appropriate cultural protocols and to make the logistical arrangements for conducting the research. The male research assistant's role differed due to his superior English, Javanese and Bahasa language skills, which allowed him to conduct and translate the interviews and focus group discussions. Although extensive training was provided to this research assistant (e.g. in ethical matters, types of questions and follow-up questions asked) due to translation and validity issues with some of the results, it was necessary to re-interview and conduct new interviews towards the end of the data collection period. Of the original 118 interviews conducted, 36 were discarded completely, 18 were never translated, and 64 were selected for re-interview to confirm the data and ensure consistency between the first and second

interview periods. Of the 64 selected for re-interview, only 52 were included in the final data set due to difficulty finding some of the previous interview participants, and mismatching data. Two new research assistants, both female, were hired to conduct the re-interviews along with 78 new interviews. In the second phase of interviewing, follow-up and new interviews were recorded in order to provide quality control and support the translation of interviews. Due to time constraints, the interview question guideline in Appendix 2 was used in a more structured nature to provide further guidance to the research assistants as they conducted their interviews. This will be further discussed during the challenges and limitations section. One of these new research assistants had been heavily involved in previous research regarding the earthquake and subsequent recovery efforts, and was able to provide detailed information and context for the responses of many of the interviewees. Throughout the entire research period, all four research assistants provided substantial information regarding the context of Javanese social and cultural traditions, as well as understandings of their experiences conducting the research and how they interpreted different responses.

3.2.6 *Research Ethics*

In order to conduct the research, there was a series of ethical and research permit procedures that were completed in order to obtain approval to begin the research process. First, the research methods were reviewed by the Office of Research Ethics (ORE) at the University of Waterloo. This involved completing the required forms, including outlining the research proposal, details of the study, research methods and identifying potential risks to the participants in the study. Furthermore, the informed consent process was outlined and methods for maintaining anonymity of participants and confidentiality of data during the research process as well the dissemination of research results were outlined. Recruitment scripts and interview guidelines were reviewed by the ORE and a few minor recommendations were made to improve the quality and procedures involved with recruiting participants and obtaining consent. All research methods complied with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (2nd Edition).

In order to conduct the research in Indonesia, it was necessary to apply for a research permit through the State Ministry of Research and Technology (RISTEK). This required partnering with a local scientist from an Indonesian university or research institute, in this case, the Tsunami Disaster and Mitigation Research Centre (TDMRC) connected with Syiah Kuala University in Banda Aceh. The application required submission of the research proposal, letters of

recommendation, letter of support from the TDMRC, health certificates, and personal supporting documentation (e.g. copy of passport, photographs etc.). Once the research permit application was approved, the researcher was granted a visa to enter the country for research purposes. On arrival in Jakarta, the researcher reported to the RISTEK office to obtain the research permit card and letters to submit to other related government agencies at both the central and provincial levels (e.g. Police Headquarters, Home Affairs Department, Immigration Office etc.). Through this process, the researcher was granted the Traveling Permit (*Surat Keterangan Jalan*) and a Limited Stay Permit Card (KITAS). These permits were required at the local level to indicate to the local community governments that the research had been reviewed by the Central government and appropriate permissions had been obtained. This facilitated entry into the research communities in order to begin the data collection process.

3.3 Data Analysis

Although case study research suggests that results are based on the “investigator’s own style of rigorous thinking, along with the sufficient presentation of evidence and careful consideration of alternative interpretations” (Yin, 2003, p. 110), an approach to manage, organize and critically analyze the data is still required. In order to effectively evaluate the various data sources, a series of separate data analysis techniques were conducted. The analysis helped to reduce the large amount of data collected in order to arrange the comments along common themes, as well as explore the data set in order to generate theory on the disaster recovery process (Cope, 2010). The following section outlines the process of how each type of data was organized and analyzed.

3.3.1 Household Interviews

The household interviews were analyzed using two main processes. The first was to statistically compare and describe different responses and relationships, whereas the second was to qualitatively assess themes from the interviews themselves. In order to initiate both the statistical and qualitative approaches, the data were entered into an excel spreadsheet and responses were categorized under key themes, called descriptive or topic codes (Cope, 2010). The descriptive coding process organized the data and allowed for description, categorization and reflection (Morse & Richards, 2002). These descriptive codes were a manifestation of the types of questions asked to household interviewees and included such themes as ‘livelihood strategies’ or ‘hazard

mitigation strategies'. Demographic information was included in this spreadsheet in order to compare variations in household responses to demographic variables.

For some of the identified research themes, the data allowed for statistical descriptions of the results. In these cases, the data were numerically coded based on defining responses into set categories. The coding technique allowed for multiple responses, for example, in the occupation category, respondents may be engaged in more than one income generating activity, so the coding process made provisions for those circumstances. For some themes and categories, it was fairly clear how to code the data, although the qualitative nature of the data collection limited this technique for other themes. For themes where coding and statistical descriptions did not suit the data, coding and statistical descriptions were not completed in order to maintain the integrity of the data and analysis. In other cases, the nature of interview responses limited the reliability of using statistical methods. This was due to the type of follow-up questions asked (i.e. not all interviewees were asked the same questions) as well as the comments provided by respondents. In these cases, qualitative methods provided a more appropriate analysis strategy.

In terms of the qualitative analysis, the data were analyzed using both the categorized data in the spreadsheet (i.e. examining themes within the data subset of hazard mitigation strategies) as well as exploring themes through analysis of the entirety of each interview. Although the interviews were not translated and transcribed verbatim, the translated interview documents provided a detailed summary of interviewee comments, allowing for detailed qualitative analysis. These interviews were coded using open coding: open coding is an inductive process whereby data and concepts in the interviews are linked and labelled based on previously identified theoretical constructs, as well as emerging patterns and trends (Morse & Richards, 2002; Strauss & Corbin, 1998). This type of analytic description involved the “identification of recurrent patterns or themes and attempting to construct a cohesive representation of the data” (Warren & Karner, 2010, p. 218). These recurrent themes were then linked back to identified issues in the research literature in order to develop interpretations of the phenomena occurring in the case study.

3.3.2 Focus Group Discussions

The focus group discussions were analyzed similarly to the household interviews. The focus group responses were analyzed using the same open coding and analytical description process described above. The discussions were organized along a series of themes and were used to clarify or

corroborate information provided in the household interviewee responses, as well as to provide new insight and information on village conditions and the overall recovery experience from a larger-scale perspective.

3.3.3 *Expert Interviews*

Almost all the expert interviews were conducted in English, allowing for a slightly different method of organization and analysis compared to the household interviews. Expert interviews were conducted by the researcher and recorded and transcribed verbatim. Consequently, the analysis of the comments and word choices of the interviewees as compared to the household interviews was more detailed. While the expert interviews provided important information on the overall characteristics and decision-making processes involved in the Yogyakarta earthquake recovery effort, the responses also provided an opportunity to link back to higher-order initiatives in the development and humanitarian aid industry.

3.3.4 *Data Triangulation*

An important aspect of the data analysis process was triangulating the various data sources in order to ensure rigour and validity of the research process (Bradshaw & Stratford, 2010). As a research strategy, triangulation “involves using several methods to reveal multiple aspects of a single empirical reality...a discovery process designed to get at an objective truth that may be systematized as a formal theory of social structure and process” (Miller & Fox, 2004, pp. 35-36). Triangulation is also an approach that allows multiple and diverse viewpoints to contribute and cast light on the same topic or phenomena under study (Olsen, 2004). As a result, triangulation provided an opportunity to explore the different perceptions and experiences of disaster recovery within the context of the 2006 Yogyakarta earthquake.

In order to contribute to the process of triangulation, responses in interviews and focus group discussions held at the village scale were compared and contrasted to each other as well as to secondary data sources, including government and NGO reports, previous research publications, as well as academic and newspaper articles. Comparisons and corroborations were also made between responses at the village level to interviews conducted with government and humanitarian practitioners in order to obtain a more holistic understanding of how and why decisions were made and the impacts this had on the villages under study. The first-hand observations by the researcher also helped to corroborate or question comments made by all the respondents in the research.

3.3.5 Reporting Data Results

In the results and discussion chapters, the research outcomes are discussed using relative terms, as opposed to absolute terms. While some descriptive statistical results are provided, the overall research aims were not intending to provide definitive statistical measurements of the number of responses falling into specific categories. Instead, the research approach aimed to highlight the degree of experiences and conditions associated with vulnerability, resilience and sustainable livelihoods in the recovery process following the earthquake disaster. In order to provide some guidelines as to the terminology used to frame the research results, the following section provides an overview of specific terms used throughout the remainder of the dissertation.

- Small number:* Refers to the smallest number of responses, with generally anywhere from one to five (a small percentage) interviewees mentioning a particular issue.
- Few:* Refers to a small percentage of respondents, although slightly more than a small number.
- Some:* Refers to instances where there are an unknown number of respondents (e.g. one respondent may have mentioned as an issue affecting several households although only a small number of respondents raised the issue). This term also refers to anywhere from 10 - 20 interviewees providing similar responses related to a particular issue. In certain cases, the term 'some' is representative of a similar proportion of a smaller group of respondents (e.g. refers to a relative proportion of households engaged in farming activities).
- Number:* Similar to the term 'some', the term is used to express an unknown number of respondents whereby household interviews indicated the issue affected a larger proportion of villagers although precise estimates are unknown.
- Several:* Refers to approximately 20 - 30% of respondents. This term is also used in proportion to the specific group referred to.
- Many:* Refers to issues/areas where a substantial number of respondents provided similar comments. The use of 'many' implies that the proportion of responses is approaching a majority.
- Majority:* Refers to instances where over half of the proportion of respondents indicated the same or similar responses.

3.4 Challenges and Limitations

As with any research, a variety of challenges and limitations were encountered. As the case study site was located in Indonesia, this presented a variety of ethical, methodological and logistical issues in terms of completing the data collection process. Household interviews, focus group discussions, expert interviews and many secondary data sources were conducted in a language not readily spoken by the researcher. The researcher was visibly a foreigner working in the context of a hierarchal society whereby class, income, religion, education and ethnicity play a role in everyday social interactions and power relationships. In some cases this may have worked to the advantage of the researcher as participants were eager to participate and share their opinions and ideas, although there were obvious disadvantages in terms of misunderstandings, lack of trust, expectations of donations etc. Researchers have noted that these differences between researcher and research participants (termed social distances) can impact the overall research process: “interviewees may not trust us, they may not understand our questions, or they may purposely mislead us in their responses” (Miller & Glassner, 2004, p. 128). Although in some instances this may have been the case, during the research, the author took the time to seek local support and consent for the research, participated in local events with villagers and attempted to ensure the cultural appropriateness of data collection methods. Due to the culturally sensitive approach used, it was found that the majority of participants appreciated the significance of the research, were interested in participating and sharing their ideas and perceptions, and viewed the researcher as a useful advocate for expressing the needs of the village (Howitt & Stevens, 2010). While the positive response from villagers contributed to a productive research environment, there were still some issues and challenges that arose during the data collection period. The following sections provide an overview of the challenges of conducting the research, the limitations of the data collected, as well as the mitigation strategies employed to circumvent these challenges and limitations.

3.4.1 Research Challenges

In terms of language difficulties, several challenges were presented when conducting the research. Language limitations may present a challenge in obtaining accurate understandings of local survivors’ opinions, attitudes and perceptions (Steger, 2004). While the use of skilled translators and research assistants were employed, the chance of misinterpretation remains (Hutchings, 2004). The perceptions of the participants experienced a double interpretation as their ideas and words

were both translated in language, as well as filtered through an intermediary. In many cases, the research assistants provided a summary translation of the statements made by interviewees, as opposed to word for word translations. This may have led to misinterpretations, misperceptions and/or translation errors although every effort was made to clarify and repeat statements back to interviewees to ensure accuracy.

There were also issues associated with the use of Bahasa Indonesian language to conduct the interviews. While the male research assistant was able to conduct interviews in Javanese when deemed necessary, the two follow-up research assistants had limited to no Javanese language skills. In the context of Javanese hierarchal culture, this meant that respondents speaking Bahasa Indonesian were speaking 'up' to the research assistants due to the latter's higher education and use of a formally-taught language. Thus, the hierarchal nature of the cultural context as well as the limited Javanese language skills of the research assistants may have hindered the ability to obtain a more accurate and fuller understanding of the interviewees' thoughts and opinions on the recovery effort. The final impact that language had on the research was through the collection of secondary data sources. Multiple Indonesian universities in the area had conducted research on the earthquake event and the subsequent recovery programs, although many of these documents were published only in Bahasa Indonesian. The time and cost constraints associated with translating these documents word-for-word meant that many of these reports were skimmed for the analysis.

The culture and societal structure of the study region also had an impact on interviewee responses at both the household and expert levels. Javanese culture has a multitude of hierarchal and societal structures associated with use of language, negotiated social landscapes and prescribed gender roles (Lamoureux, 2003). Particularly with the poorer, more marginalized villagers, there were difficulties associated with respondents feeling comfortable in stating their thoughts and opinions. Many respondents from these groups noted that they were not in a position to critique the response and recovery efforts of the government and humanitarian organizations, and refrained from providing responses. Furthermore, Javanese culture values order, peace and harmony, with individuals rarely disagreeing with others face-to-face, criticisms generally being stated in a polite manner, mistakes being seldom acknowledged in order to save face, and deference being given to those in higher social, political and economic positions (Forshee, 2006). This may have limited interactions within the focus group discussions, with participants rarely contradicting the statements of other participants.

As would be expected in any research, on occasion there were also issues associated with the research assistants themselves. In some cases, research assistants did not ask, or did not follow-up with all interview questions, resulting in a fairly significant (approximately 20%) lack of data for some questions. In some instances, research assistants may have asked interview questions in a leading manner, particularly if interviewees had difficulty responding to a particular question. Furthermore, misunderstandings and miscommunications resulted in interviews that had to be removed from the final data due to validity issues. This resulted in two sets of data that were collected: the initial set of 52 interviews conducted with one research assistant, and another phase of interviewing conducted with two new research assistants. Although it is recognized that there may be some consistency issues in terms of how research assistants asked the interview questions, the researcher made every attempt to maintain linearity between the two interview phases. Questions were standardized in the second phase, and interviews were conducted together in the initial training phase (i.e. both research assistants, along with the researcher, were together with the interviewee for the first village follow-up and new interviews). The second phase interviewees were also asked to restate their opinions on some questions in order to ensure consistency of their responses. All translated interviews were reviewed together with the researcher and both research assistants in order to discuss any issues arising each day, and ensure some level of uniformity. While the author has highlighted the issues in terms of organizing and maintaining consistent standards among a research team of five individuals (the researcher and four research assistants), overall, the research assistants greatly improved the research and data collection process as well as provided valuable connections, information, knowledge and insight into Javanese culture and village life, the overall recovery effort as well as appropriate procedures and conduct in a variety of contexts.

3.4.2 Mitigation Strategies for Research Challenges

Two main strategies were used throughout the research in order to mitigate the issues associated with conducting research in a culturally, linguistically and socially different context. The first was to employ the use of local research assistants to conduct the interviews in at least one of the two local languages; the second was to pilot test the interview and focus group questions with community leaders and research participants in order to allow input and influence over the data collection process.

As noted above, four research assistants were used throughout the research process to facilitate the collection of data. Training and daily discussions on interpretation and language issues helped to ensure that the assistants were understanding the needs and requirements of the project, as well as to ascertain any of the issues they may have had with the interview questions or conducting the household interviews. The researcher accompanied and attended all household interviews and focus group discussions, which allowed the research assistants to translate directly in the field (on some occasions) and discuss where further clarifications were required. Along with these research assistants, connections with village leaders, the use of community representatives while conducting the household interviews, as well as the careful selection of households that would be included in the research, all contributed to mitigating some of the challenges of conducting research in a foreign language and culture.

The second mitigation method that was used during the interviews was to establish rapport and support the opinions and ideas of community leaders and research participants (Warren & Karner, 2010). Community leaders and research participants were given the opportunity to reflect on the questions asked and methods for improving responses (Miller & Glassner, 2004). For example, in the pilot testing phase, respondents noted the difficulty in answer the questions regarding the ‘success’ of the recovery effort. They felt the term ‘success’ implied the recovery was finished and therefore, made it difficult to respond to the question. Instead, the questions were revised slightly in order to obtain information about what respondents felt was done well, what could be improved and what their opinions were on what would define a ‘finished’ recovery effort. While this did not result in a significant change in the actual questions asked, it demonstrates that community members felt comfortable sharing their thoughts and making recommendations regarding the research process. Community leaders were able to provide feedback on the appropriateness of certain questions and methods for facilitating dialogue with interviewees. Engaging in a process of discussion with community leaders allowed the leaders some input and influence in the research process and increased their willingness to participate and facilitate participation from community members.

3.5 Summary and Conclusion

The methodology chapter has highlighted the preliminary conceptual framework for the research, focusing on how resilient disaster recovery can be understood through the concepts of vulnerability, resilience and sustainable livelihoods. This framework was used as the basis for the

evaluative approach for assessing long-term recovery after the 2006 Yogyakarta earthquake, providing an idealized conceptualization of resilient disaster recovery to which the research results could be compared. Furthermore, the conceptual framework provided the preliminary foundation for understanding resilient disaster recovery which will be further refined in chapter seven.

An overview of the research methods was provided, focusing on how the qualitative research methods were instrumental in providing an in-depth understanding of the recovery process as well as local perceptions of the recovery program. Research methods consisted of a variety of approaches, including semi-structured household interviews, focus group discussions, expert interviews with academic, government officials and NGO practitioners, as well as participation observation and analysis of secondary sources. This created a multi-scalar approach whereby household interviews focused on the individual/household/community level, focus group discussions emphasized a community-level understanding of the recovery effort, and the expert interviews provided larger-scale (provincial, national and international) perspectives on issues of vulnerability, resilience and sustainable livelihoods. Data analysis methods highlighted how the multiple methods were brought together to provide a holistic understanding of the recovery effort from multiple perspectives and angles.

Finally, some of the challenges and limitations of the data set were discussed, including language and cultural barriers, although the strategies used to mitigate these issues demonstrates how the local villages were included and facilitated the research process. While chapter three has summarized the research framework and data collection methods, the following chapter provides an overview of the case study site in order to provide sufficient background information to support the research results and discussion chapters.

4.0 INDONESIA AND THE 2006 YOGYAKARTA EARTHQUAKE

The case study site selected as the basis for this research is the 2006 Yogyakarta, Indonesia earthquake event. As one of the most hazard-prone countries in the world, Indonesia has experienced a long and storied history with disaster events. Catastrophic events such as the eruption of Krakatoa in 1883, as well as the more recent 2004 Indian Ocean tsunami that devastated the province of Aceh and resulted in over 220,000 deaths, have been well-publicized and well-studied (Clarke, Fanany, & Kenny, 2010). Smaller disaster events, such as floods, and landslides, although not as widely publicized internationally, occur on a regular basis throughout the country (IRIN, 2010). Arising from this frequent exposure to hazards and disasters is an increasing recognition of the need to incorporate a holistic approach to disaster management and risk reduction measures.

It is within this context of shifting disaster management paradigms that the Yogyakarta earthquake occurred on May 27, 2006. As a consequence of the earthquake event, there were considerable damages to buildings and livelihoods in the region, leading to a significant long-term recovery program. The long-term recovery program provided the basis for the case study analysis in order to achieve the three objectives set forth at the beginning of the dissertation. These include refining the conceptualization of resilient disaster recovery, empirically testing the RDR-AF as an evaluative framework that incorporates the intersections of vulnerability, resilience and sustainable livelihoods in the post-disaster context, as well as providing empirical evidence of one long-term disaster assessment.

In order to provide sufficient background information to support the results and discussion sections, this chapter provides a brief history of Indonesia, as well as Indonesia's experience with hazards and associated policy approaches. Such information is useful for understanding the historical, political and legal context in which the earthquake event occurred. This is followed by an overview of the selected case study, the 2006 Yogyakarta earthquake, including the damages and losses, the recovery program and early assessments of the recovery as examined by the various NGOs involved in the reconstruction effort.

4.1 Indonesia

The islands of Indonesia are located in Southeast Asia, as shown in Figure 4.1, and have a population of just over 240 million, making it the fourth most populated country in the world

(World Bank, 2011). With over 17,500 islands, 1,000 of which are permanently settled, this vast archipelago has a high degree of diversity, with over 200 major cultural and linguistic groups (Vickers, 2005). Home to the largest Muslim population in the world, Indonesia is actually a secular nation with a history of attempting to build religious tolerance, specifically under the national ideology of *pancasila*⁷ (Ricklefs, 2008). Although it is difficult to provide a summary of such diversity in traditions, cultures and history, the following sections provide a brief overview of the history of Indonesia, in order to provide context for its experiences with natural disasters and how this has contributed to the current disaster mitigation policy context.

Figure 4.1: The Islands of Indonesia



Source: (CIA, 2012)

4.1.1 Brief History of Indonesia

While the various islands of Indonesia have each enjoyed a long and rich history, the formation of the modern territory can be traced back to the beginning of Dutch colonial rule, with the establishment of the United East Indies Company in Batavia (now Jakarta) in 1619 (Vickers, 2005). Over the next 200 years, the Dutch expanded their control over the islands of Java, parts of Sumatra, Sulawesi, Timor and Maluku. As the Dutch expanded their empire into Kalimantan, New Guinea, Bali and Lombok during the late 19th century, some areas engaged in negotiations with the colonial power, whereas others engaged in conflicts, particularly in Aceh and Bali (Ricklefs,

⁷ Pancasila refers to the Indonesian national ideology first espoused by Sukarno in 1945. The five principles are: the principle of one lordship, humanitarianism, nationalism/national unity, democracy, and social justice (Darmaputera, 1988; Vickers, 2005).

2008). By the 1920s, the Dutch East Indies territory had expanded to include the many islands that make up the current country of Indonesia today. It was during this period, in the beginning decades of the 20th century, that the nationalist movement in Indonesia began to develop; previous to this period there had been limited nationalist spirit as the colony had only recently been united as ‘the Indies’ by the Dutch (Bertrand, 2004; Emmerson, 2005; Vickers, 2005).

During World War II, Dutch control over the Indies colony collapsed and the islands of Indonesia were occupied by the Japanese from 1942 – 1945. Under the Japanese occupation, sentiments of Indonesian nationalism and anti-Western campaigns grew, and in some cases, were actively encouraged and mobilized by the Japanese (Lamoureux, 2003; Ricklefs, 2008). After the Japanese defeat at the end of the Second World War in 1945, Indonesia, under the leadership of Sukarno, declared independence, although four years of hostilities, negotiations and UN intervention were required until the Dutch relinquished their authority in 1949 (Lane, 2008). Sukarno had the difficult task of trying to unite a culturally and linguistically diverse nation that had been through years of brutal hardship, suffering, violence and dislocation, as well as an economy that had been depressed through Japanese occupation and a colonial system designed to extract natural resources and send profits overseas (Vickers, 2005). During his time in power, under the slogan of ‘guided democracy’, President Sukarno viewed the primary role of the state as a means to improve the living standards and welfare of the people and focused on improving access to education, health and basic necessities. Sukarno’s socialist approach alienated the United States and Britain, and Sukarno increasingly turned to communist Russia and China for foreign aid and assistance (Lane, 2008; Vickers, 2005). Throughout this period, large-scale development initiatives focused on perpetuating and maintaining Indonesian nationalistic sentiments through grandiose buildings and monuments, and hostility towards Western democratic and capitalist systems led to an internal economic approach (Lamoureux, 2003).

During the 1960s, economic problems in Indonesia were exacerbated by increasing foreign indebtedness, falling exports and increasing inflation rates (Ricklefs, 2008). In 1965, divisions within the military came to a head as factions (namely members from the air force and Sukarno’s praetorian guard) supporting Sukarno killed several of the country’s generals (Lane, 2008). This action was heavily suppressed by other factions of the military, under the leadership of Major-General Suharto. Major-General Suharto was able to gain control of the capital, Jakarta, and denounced the uprising as a coup enacted by the Communist Party of Indonesia (PKI) (Vickers,

2005). Suharto's coup set into action a period of intense violence whereby civilians were encouraged, with the support of the army, to violently attack alleged communists. The communist party was banned and it is estimated that between 500,000 - 1,000,000 Indonesians were killed and several hundred thousand more were imprisoned during this period of violence (Lane, 2008; Vickers, 2005). In 1966, the politically weakened Sukarno transferred much of his power over to General Suharto, and by 1968, Suharto was declared 'Acting President' (Ricklefs, 2008; Vickers, 2005).

With the Suharto, or New Order, government, sweeping economic reforms were introduced, including emphasis on foreign direct investment, deregulation and liberalization of capital movement (Iqbal & Rashid, 2002). International support for this transition by Western countries, particularly the United States, allowed Indonesia to re-engage with international economic institutions, including the World Bank and the International Monetary Fund (IMF). Significant levels of foreign aid and loans, as well as debt restructuring provided massive amounts of funding for economic development and industrialization efforts (Lamoureux, 2003; Ricklefs, 2008). Many of the economic development policies during this period focused on the extraction and exportation of natural resources, although President Suharto struggled to balance external demands from the US, World Bank and IMF for deregulation and internal desires for national protectionism (Potter, Binns, Elliott, & Smith, 2004; Vickers, 2005).

President Suharto's regime was supported through a series of violent campaigns that instilled terror and fear among the population and suppressed many forms of opposition to his leadership (Hefner, 2005; Lane, 2008). The violent suppression of political and student groups, independence movements (particularly in Aceh, East Timor, Papua and Irian Jaya), as well as Islamic organizations all contributed to the centralization of power within Suharto's government and military elite (McVey, 2003). Propaganda, strict central control over media and newspapers, as well as censorship were all components of a state-run terror program designed to maintain control and order over a large population (Vickers, 2005). The regime was also supported through the sharing of benefits among an elite group that helped maintain Suharto's power and control over the economy. Massive corruption of foreign aid, the establishment and building of alliances of wealthy conglomerates and monopolies, the forcible acquisition of successful businesses, and the fleecing of revenue through state controlled institutions (such as banks and Ministries) led to the establishment of an ultra-wealthy elite group of Indonesians (Clear, 2005). Connections to these

ultra-elite provided ample economic benefits and helped contribute to the rise of the upper-middle class in Indonesia (Ricklefs, 2008; Vickers, 2005).

Although foreign aid and state revenue was heavily corrupted by the governing bodies, remaining amounts were used to provide programs and development projects to help the poor. Major improvements in basic infrastructure, such as road and transportation systems, as well as water and sanitation projects, the provision of primary education for all, improvements in the provision of health services, increases in rice production, and the rapid expansion of employment in basic manufacturing all led to increases in basic welfare and measures of standard of living (Ricklefs, 2008).

During the late 1980s and 1990s, a series of domestic and international events lead to rapid changes within Indonesia and the government system. The end of the Cold War coincided with US efforts to push forth a neo-liberal, free-market agenda. Controlling and corrupt dictators, such as Suharto, were seen as obstacles in the way of promoting economic development through free-market policies (Vickers, 2005). Organizations, such as the World Bank, began shifting funding away from corrupt governments, particularly in Indonesia where corruption levels reached almost 30% (Ricklefs, 2008). The memory of the still popular Sukarno and the 50th anniversary of Independence in 1995, the death of President Suharto's wife in 1996, and the Bre-X gold scandal⁸ involving Suharto's children and friends all contributed to growing resentment against the Suharto regime (Lane, 2008; Vickers, 2005). The final straw was the Asian financial crisis of 1997. In Indonesia, the Asian crisis led to the collapse of numerous industries and a severe plunge in value of the Rupiah (Clear, 2005). This coincided with a severe drought event, as well as large forest fires in Kalimantan that served to further harm the international reputation of Suharto (Stolle & Tomich, 1999). Calls for reform were heard from all aspects of society and attempts to violently suppress protests were met with outrage and further violence (Lane, 2008; Ricklefs, 2008; Vickers, 2005). Suharto resigned on May 21, 1998, promoting B.J. Habibie, the former Vice-President, to become Indonesia's third president. Although Habibie was never able to distance himself from his relationship with Suharto, he achieved significant reforms during his short presidency (Lamoureux, 2003). He reduced the power of the military, lifted censorship bans on the media, decentralized the

⁸ After it was reported that large gold deposits had been found in Kalimantan, several firms, including Bre-X, were involved in a bidding war for the rights to these deposits. After initial investments and numerous offers to the Suharto children and friends, it was discovered that no gold deposits actually existed in Kalimantan and the geological reports had been fraudulent. The loss of millions on this fraudulent report severely harmed Indonesia's international reputation and led to reluctance of foreign investment in the country.

government system and restructured the economic system under the mandate set forth by the IMF (Clear, 2005). Although these actions helped to decrease the amount of control maintained by Suharto affiliates, it also contributed to significant reductions of the middle class, reduced the real value of wages by 40% and increased poverty rates by 100% (Vickers, 2005).

Habibie's short presidency was followed by the first elected president of Indonesia, Abdurrahman Wahid, leader of the Nahdlatul Ulama (NU) Muslim religious organization. Wahid's inconsistent and informal style made him an unpopular leader, and his reconciliatory approach offended both the military and his own political party (Vickers, 2005). After a series of crises, Wahid was impeached in July 2001 and replaced with Megawati Sukarnoputri, the former President Sukarno's daughter. Megawati's lack of experience and inability to engage in meaningful reforms, and in fact, engaging in corrupt and oligarchic behaviour, demonstrated the difficulty of shifting from a government system entrenched in corruption and New Order-style thinking (McVey, 2003; Vickers, 2005). The period from Suharto's ousting in 1998 until the end of Megawati's presidency was marred by violence, conflict and attempts to destabilize the new democratic government system. The rise of ethnic violence, fundamentalist Islamic terrorism, violence between military, police, political groups and other organizations attempting to assert power, as well as continuing independence movements in Aceh, Papua and East Timor all contributed to a feeling of instability and uncertainty (Ricklefs, 2008). During this period of continued crisis, Indonesia was on the brink of social, political and economic collapse (Bresnan, 2005; Rondonuwu, 2009).

The second direct presidential elections held in Indonesia in 2004 saw the rise of a relatively unknown political figure, General Susilo Bambang Yudhoyono, known colloquially as SBY. Despite carrying a reputation as a mediator, peace-maker and reformer, SBY was part of the New Order power structure during Suharto's reign (Vickers, 2005). Winning a second five year term in 2009 strengthened SBY's position as a reformer who has brought social, economic and political stability to Indonesia and the country is once again viewed as on the verge of an economic take-off, recently joining the Group of 20 and showing strong economic progress (Rondonuwu, 2009). While issues of corruption and poverty still plague many parts of the country, a shift towards reform among some civil servants has provided optimism in the democratic system and the future of Indonesia, although this has been tempered by continued allegations of serious corruption and political bribery evident in national politics and economic activities. Scandals involving the once

highly respected Corruption Eradication Commission (Komisi Pemberantasan Korupsi, KPK) have tempered the initial optimism in SBY's will and ability to eradicate corruption (Kimura, 2011).

During the same period, beginning in 2001, the process of decentralization was enacted, with power quickly devolved from the central government to the district-level governments who were often unprepared for their new responsibilities (Fanany, 2003). Notwithstanding matters of foreign policy, defence, security, judiciary, religious, monetary and fiscal matters, the responsibility to administer the provision of public services, including education, health and infrastructure, was passed down to local government entities (Parikesit, 2009). With limited experience in governing at this level, many local government entities turned to corruption and bribery, following the only style of governing they were aware of. The centralized corruption and nepotism that existed under the Suharto regime was transferred down to the local level, creating new taxes and bureaucratic systems that have increased the complexity and difficulty of conducting business in Indonesia (Vickers, 2005).

It is within this context of historical mistrust of government institutions, a longstanding culture of corruption amongst government officials, increasing living standards, although a widening gap between rich and poor, a changing process of decentralization, and a continuing process of driving Indonesia's development forward, that the 2006 Yogyakarta earthquake disaster and recovery effort occurred. The historical and political context plays an important role in examining how the long-term recovery process was implemented, as well as some of the ongoing issues and concerns related to effectively achieving risk reduction initiatives.

4.1.2 Indonesia as a 'Disaster Supermarket'

While the above section focused on Indonesia's political history, the following section focuses on the geophysical characteristics of the country and how this has contributed to a landscape shaped by hazards. Situated at the convergence of three large crustal plates, namely the Eurasian plate, the Australian plate, and the Pacific Ocean plate, Indonesia experiences a high degree of seismic and volcanic activity, along with other hazards such as floods, landslides, droughts and forest fires (WHO, 2007). With approximately 40% of the population at risk of mortality from multiple hazards, Indonesia ranks as one of the highest risk countries in the world (GFDRR, 2009). The following sections provide an overview of the key hazards facing the Indonesian population, demonstrating the need for a multi-hazard approach in all disaster risk reduction initiatives.

Indonesia experiences a high degree of risk for major disaster events caused by earthquakes and tsunamis (James, 2008). From 2000 until 2010, Indonesia experienced 49 earthquake events with magnitude 6.0 and higher, including three events with magnitude 8.0 and over. These earthquake events resulted in the deaths of more than 237,000 people, including more than 220,000 from the 2004 earthquake and tsunami event that devastated coastal areas of Aceh (USGS, 2010). These earthquake events have also resulted in the evacuation of more than 2.5 million people, heavy damage to more than 875,000 houses, 16,468 schools, 1,230 health facilities, 342 places of worship, 60 bridges and 45km of roads, resulting in approximately US\$151.5 million in damage (UN/OCHA, 2010). More recent events, such as the 2010 Mentawai, West Sumatra earthquake and tsunami have highlighted the high vulnerability Indonesia experiences to earthquake and tsunami events (O'Loughlin, Booth, & Weaver, 2010).

Volcanic eruptions, and the associated secondary hazards such as flooding and lahars, are another major risk for the densely populated Indonesian islands. An estimated 128 active volcanoes (representing 15% of active volcanoes in the world) are dispersed throughout the islands, particularly in Sulawesi as well as along the Sunda arc which extends from Sumatra to the Banda Sea (James, 2008; WHO, 2007). Recognized as the most volcanically active country in the world, Indonesia has 70 volcanoes classified as “very active” (BAPPENAS, Provincial and Local Governments of D.I. Yogyakarta, Provincial and Local Governments of Central Java, & International Partners, 2006). During the period from 2000 - 2010, volcanic eruptions killed 12 people, injured 1,273, resulted in the evacuation of over 173,000 and damaged 364 houses with approximately US\$2.37 million in damage (UN/OCHA, 2010). These statistics exclude the more recent eruption of Mt. Merapi in late 2010 that resulted in 341 deaths, the destruction of over 2,000 homes, the evacuation of nearly 350,000 people and financial losses estimated at 781 million USD (Sumaryono, 2011). This recent event highlights the significant impacts on life, property, livelihoods, and tourism that major eruption events can have, as well as the secondary impacts of ongoing flooding and lahar flows. On the other hand, volcanoes also bring prosperity as the ash from eruptions provides rich nutrients for soil and agricultural activities in surrounding areas (Lamoureux, 2003).

Flooding is another hazard that poses substantial risk to Indonesians located in proximity to an estimated 5,000 river systems (James, 2008). Of these 5,000 rivers, approximately 30% flow through urban areas, including densely populated centres such as Jakarta, Medan and Bandung

(GFDRR, 2009; WHO, 2007). The tropical climate results in heavy rainfall, the effects of which are exacerbated by poor urban planning, deforestation and shallow river systems (WHO, 2007). Over 11 million people have been affected by flood disasters between 2000 and 2010, resulting in US \$705.7 million in damages (UN/OCHA, 2010). Significant damages to housing, buildings and infrastructure have been reported during this same period, with almost 675,000 houses, 3,235 schools, 1,489 health facilities and 189 places of worship experiencing heavy damage (UN/OCHA, 2010). Flooding can have significant impacts on livelihood activities through damages to rice fields, forests, fish ponds and irrigation systems.

Other hazards impacting Indonesia's 17,500 islands include disease and epidemics, such as avian flu, dengue fever, measles, malaria and tuberculosis, as well as tropical storms, drought, and fires, including the major forest fires in Kalimantan in 1997/1998 (Dennis & Colfer, 2006; James, 2008; WHO, 2007). Human-induced events, such as political disturbances and violent conflict have occurred in multiple locations, including Aceh, Maluku, Poso, Sambas and West Timor (James, 2008). Transportation accidents, particularly air and boating accidents have occurred on multiple occasions during the past ten years, resulting in hundreds of deaths (Cutler, 2011).

While geological, hydrological and meteorological conditions lead to high risk of multiple hazards, the social and political conditions in Indonesia also contribute to the risk of experiencing a disaster event. Population increase and rapid urbanization have contributed to the high percentage of the population at risk of experiencing multiple hazardous events. With over 50% of the population residing in urban areas, and urban growth rates that are rapidly outpacing national growth rates, the capacity of government systems to develop adequate housing and infrastructure in urban areas has been outpaced. This has led to poor planning, limited enforcement of land use zoning and increases in informal settlements (GFDRR, 2009). High population densities, particularly in hazard prone areas, have increased the number of people at risk of suffering death, injury and damages due to hazardous events (WHO, 2007). Environmental degradation and poor resource management strategies have not only contributed to increased risk, but has also been attributed to creating new hazards (WHO, 2007).

Due to the range and frequency of various disaster events, Indonesia has been termed the "supermarket of disasters" (James, 2008, p. 424). This ongoing and frequent exposure to hazardous events has led to increased focus by local, provincial and central governments regarding reducing vulnerability and risk to hazardous events and implementing disaster risk reduction initiatives.

4.1.3 Indonesia's Disaster Management Law 2007

During the period from 2001 - 2007, Indonesia experienced more than 4,000 disaster events, including three major disaster events: the 2004 Indian Ocean Tsunami, the 2005 Nias earthquake and the 2006 Yogyakarta earthquake (BAPPENAS et al., 2006; GFDRR, 2009). These major events have resulted in a shift in the government approach to prepare and respond to disaster events in Indonesia (Parikesit, 2009). Until that time, the government approach to disasters could be described as reactive and 'ad hoc' in nature (James, 2008). As government officials increasingly recognized the social, economic and political costs of responding to and recovering from an increasing number of disaster events, there has been a push towards implementing a more holistic disaster management approach.

This shift in the Indonesian approach occurred in conjunction with international efforts to mainstream disaster risk reduction initiatives and incorporate elements of preparedness and mitigation to try to reduce the impacts of disaster events globally. The international paradigm shift started in the 1990s when the United Nations General Assembly declared 1990-1999 the International Decade for Natural Disaster Reduction (IDNDR) and through the creation of the Yokohama Strategy and Plan of Action for a Safer World conceived at the World Conference on Natural Disaster Reduction in Yokohama in 1994 (UNISDR, 2004). This was followed by the creation of the United Nations International Strategy for Disaster Reduction in December of 1999, and the development of the first internationally accepted framework for disaster risk reduction set out in the Hyogo Framework for Action (2005 - 2015) (UNISDR, 2005). Consequently, a stronger international push towards mainstreaming disaster risk reduction contributed to the implementation of disaster management framework in Indonesia.

While nationally coordinated disaster management organizations have existed in Indonesia since 1966, no formalized legal framework existed for governing the activities of these organizations until 2007 (PLANAS PRB & Forum PT, 2009). Buoyed by the devastation of the 2004 Indian Ocean tsunami and the outpouring of international support and funding to promote an integrated disaster management program, the Indonesian government began the process of establishing a legal framework for implementing a more holistic approach to disaster management activities. The beginning of the disaster management bill was drafted and discussed throughout 2005 and was enacted as the Disaster Management Law (Law No. 24/2007) on March 29th, 2007 (PDRSEA, 2008). The law outlined the principles of the national disaster management system, as well as the

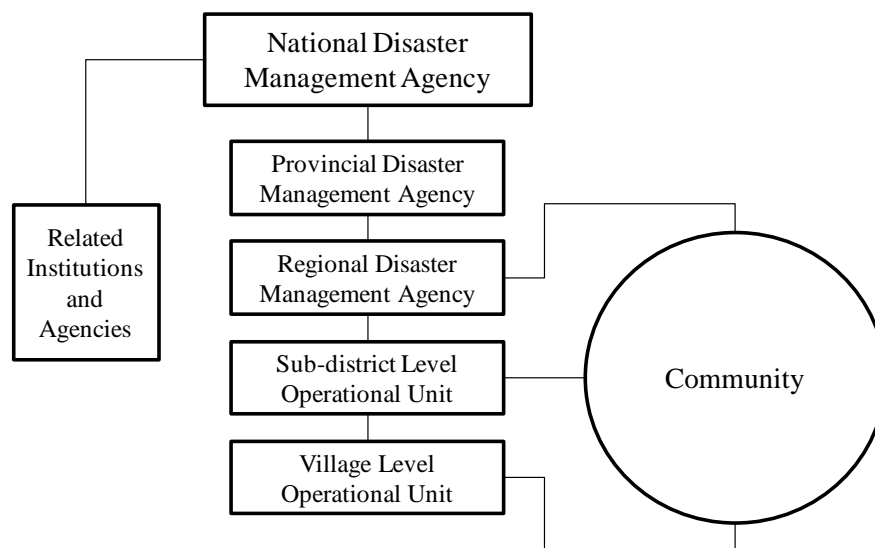
division of labour, organization and the role of international organizations (GFDRR, 2009). The Disaster Management Law highlights three major paradigm shifts in the government approach to disaster events: firstly, there was a shift from response to a holistic approach that recognized the role of preparedness, education and mitigation activities in preventing disaster events; secondly, that protection from disaster events is seen as a basic right of the people and the responsibility for providing this protection should be a key role of the government (WHO, 2007), and; thirdly, that while the responsibility for protecting the people is held by the government, disaster management initiatives should be shared among all people and communities in order to effectively integrate disaster management into the public domain (PDRSEA, 2008).

In order to implement the Disaster Management Law, a National Agency for Disaster Management was established (*Badan Nasional Penanggulangan Bencana - BNPB*), replacing the previous cumbersome system organized under the National Disaster Management Coordination Agency (BAKORNAS) (PLANAS PRB & Forum PT, 2009; WHO, 2007). This was to be followed by the establishment of provincial and district level (where needed/applicable) disaster management agencies, although the implementation of these institutions has been slower. The structure of government institutions responsible for disaster management, like many other governmental structures in the country, is based on a top-down hierarchal structure, as depicted in Figure 4.2 (Mei & Lavigne, 2012). In this respect, policies and major decision-making for disaster management are set forth by the central government and other national agencies, although activities and programs are administered through the local level government programs at the community level.

In concurrence with the implementation of the disaster management law, the central government also initiated its National Action Plan for Disaster Risk Reduction (NAP-DRR) for 2006 - 2009 in accordance with the Hyogo Framework of Action 2005 (WHO, 2007). The action plan aimed to integrate and mainstream disaster risk reduction initiatives into all development planning at various administrative levels (PDRSEA, 2008). This was followed by the University Forum (Forum PT) (a consortium of over 20 tertiary and research institutions) that provided a research and knowledge-based support system to support the development of effective planning and disaster management institutions (PLANAS PRB & Forum PT, 2009). The intellectual forum provided the domestic leadership and expertise that allowed the development of the National Platform for Disaster Risk Reduction (PLANAS PRB), officially launched on April 26, 2009. The platform represents the

coalescence of DRR stakeholders in Indonesia, including international organizations, civil society, professional associations, tertiary and research institutions (Forum PT), government (BNPB), media and the private sector (PLANAS PRB & Forum PT, 2009).

Figure 4.2: Disaster Management Organizational Structure in Indonesia



Source: Adapted from (Mei & Lavigne, 2012)

In summary, James (2008) reviews how the disaster model used in Indonesia has been shifting from a reactionary approach to a more comprehensive effort designed for mitigation, preparedness and building capacity under a comprehensive set of elements that include:

- 1) Establishing and revising disaster management laws to incorporate contemporary ideas in disaster management as well as providing additional funding and prioritizing disaster mitigation.
- 2) Increasing government capacity at local, provincial and national levels through increased funding as well as additional access to information and technologies. As a result of this increased emphasis on disaster preparedness, the first-ever Disaster Awareness Week was held in Jakarta in September 2006 with the goal of providing education and “creating a culture of preparedness” (James, 2008, p. 427).
- 3) Funding and technical support on behalf of the international community, including the UNDP, AusAID, JICA, USAID and the World Bank, has helped the government to increase capacity-building and disaster preparedness activities (GFDRR, 2009).

- 4) Throughout Indonesia there has been a strong emphasis on supporting community-based disaster reduction initiatives and collaboration among NGO's and other organizations involved in disaster management (PDRSEA, 2008).
- 5) Public awareness and involvement is the final important aspect as Indonesia transitions from a centralized to decentralized government system. As various communities, government bodies and organizations adjust to this transition, there is some difficulty in maintaining collaboration and organization amongst the various programs (James, 2008).

Shifting approaches to managing disasters are also evident throughout Indonesian society, with increasing recognition that disaster events are not only a natural phenomenon, but also impacted by human factors such as lack of preparedness, lack of knowledge, land-use planning, resource management and maintenance of infrastructure (Yansen, 2012). It is within this shifting institutional context and approach to managing disaster risks that the 2006 Yogyakarta earthquake and subsequent recovery effort occurred.

4.2 Yogyakarta Earthquake Event

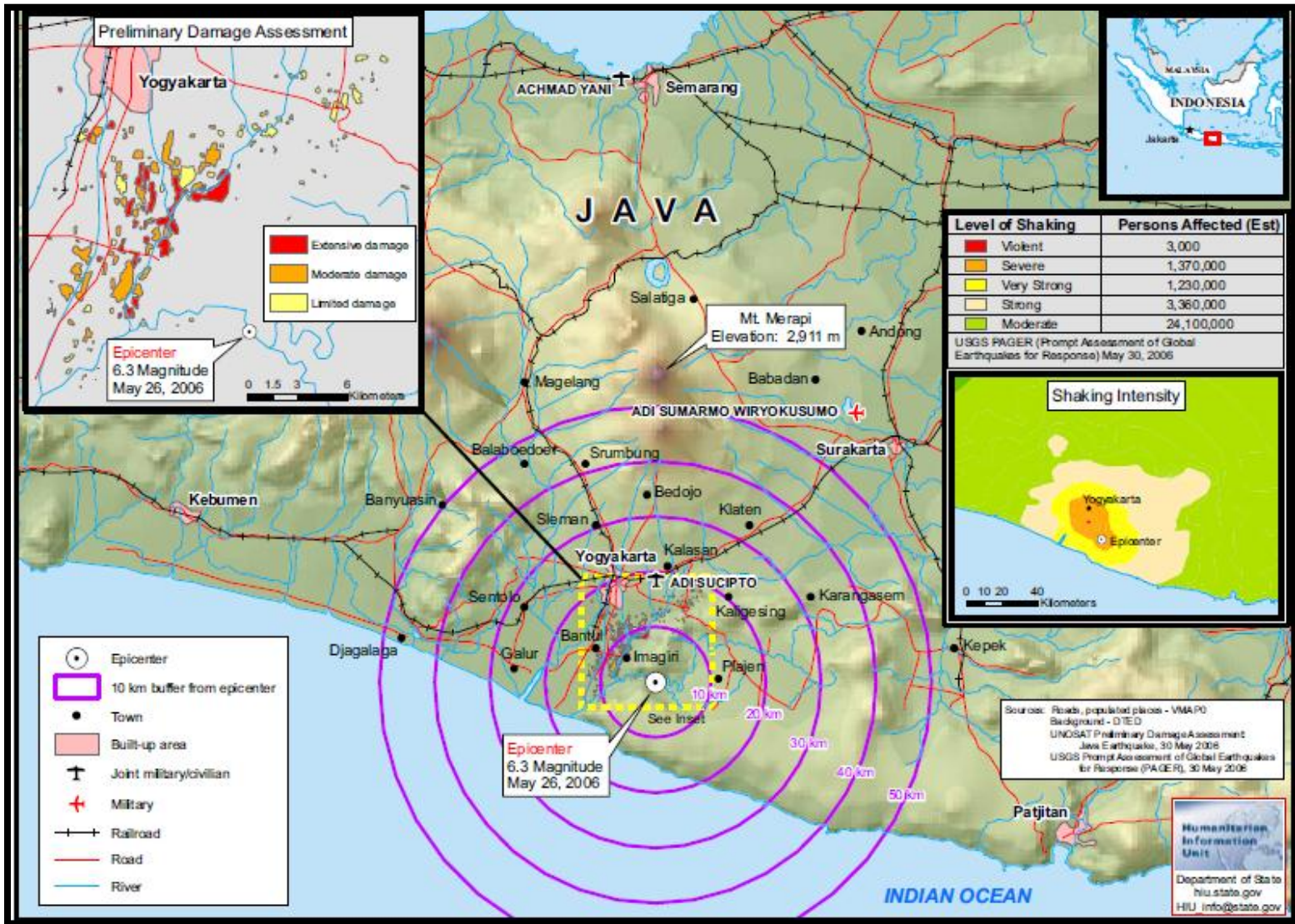
On Saturday, May 27, 2006 at 5:56am local time, Yogyakarta and Central Java Provinces were struck by a 6.3 magnitude earthquake, with the epicenter located south of Yogyakarta city – see Figure 4.3 (Elnashai, Kim, Yun, & Sidarta, 2007; Resosudarmo, Sugiyanto, & Kuncoro, 2008). The earthquake affected all districts in Yogyakarta, as well as nearby districts of Boyolali, Klaten, Magelang, Purworejo, Sukoharjo, and Wonogiri in Central Java province (BAPPENAS et al, 2006). Due to the shallow depth of the earthquake, intense ground shaking was felt for almost one minute, resulting in severe damages to the densely populated area, particularly in the districts of Bantul in Yogyakarta province and Klaten in Central Java province (BAPPENAS et al., 2006). With an estimated death toll of over 5,700, between 40,000 – 60,000 injuries, the total destruction of over 150,000 buildings and more than 200,000 more suffering varying degrees of damage, the Yogyakarta earthquake was the most devastating global disaster of 2006 (BAPPENAS et al., 2006; Elnashai, et al., 2007; Munich Re, 2007; Resosudarmo, Sugiyanto, & Kuncoro, 2008). This event also represents one of the worst disasters in recorded history in terms of the degree of building damage (MacRae & Hodgkin, 2011). The following sections provide an overview of the geophysical aspects of the earthquake, the physical and infrastructural damages, as well as the social and financial losses and impacts.

4.2.1 Geo-Physical Aspects of the Earthquake

The tectonics of the Yogyakarta area is dominated by the subduction of the Australian plate under the Sunda micro plate, although these processes are also influenced by the movement of the Pacific plate (Walter, et al., 2008). Subduction occurs at a rate of approximately 5-6cm/year and the impacted area of Java is subjected to regularly occurring earthquakes, although these vary in origin, depth and magnitude (Elnashai, et al., 2007; Munich Re, 2007). While these deeper subduction processes can cause major earthquake events, the shallow depth of the May 27th, 2006 earthquake indicates it originated from local faults on the Sunda plate that are stressed due to the deeper, underlying processes of subduction between the Indo-Australian and Eurasian plates (Tsuji, et al., 2009). The left-lateral strike-slip movement resulted in an estimated fault rupture length and width of 20km and 10km, respectively (Elnashai, et al., 2007; Tsuji, et al., 2009). Although there is some discrepancy on the location of the epicentre, the approximate location was 25 km South/South-East of Yogyakarta city with a depth of 10km resulting in intense ground shaking across an area of approximately 200km² (Elnashai, et al., 2007; Tsuji, et al., 2009).

Originally thought to have originated from the Opak River fault, located along the line of heaviest damage, seismic evidence suggests the 2006 earthquake rupture occurred 10km east of the Opak River along a previously unidentified fault running through the mountainous region of Gunung Kidul (Tsuji, et al., 2009; Walter, et al., 2008). Within the areas impacted by ground shaking, the intensity of shaking was influenced by local ground conditions. The impacted areas are located in close proximity to the active Mt. Merapi volcano, situated approximately 25km north of Yogyakarta city. Significant volcanic sediment deposits, caused by post-eruption lahars, occur on a regular basis in this region (Lavigne & Thouret, 2003). Areas with thicker layers of volcanic sediments experienced greater shaking motions as the characteristics of these soils have a tendency to amplify ground shaking motions as well as extend the length of time of shaking (Elnashai, et al., 2007; Munich Re, 2007). The highest levels of damage were not necessarily experienced in the epicentral areas, but along the eastern edge of the graben/valley running from Yogyakarta to the coastal areas where volcanic sediments were thickest as demonstrated in Figure 4.3 (Munich Re, 2007; Walter, et al., 2008).

Figure 4.3: The May 27, 2006 Yogyakarta Earthquake



Source: (USGS, 2006)

The earthquake caused a series of secondary disasters, including slope instability, rock falls, soil failure, ground fissures, impacts on the water table level and water quality, as well as increased volcanic activity in nearby Mt. Merapi (which was already experiencing elevated levels of activity previous to the earthquake event) (Munich Re, 2007; Elnashai, et al., 2007; Walter, et al., 2008). While there were rumours immediately following the earthquake of an impending tsunami, and many locals believe that a tsunami warning was issued, no tsunami warning was ever issued for the area following the earthquake (CM-04).

While the scientific data provides an overview of the mechanisms and processes of the earthquake, discussions with local residents who experienced the event also provided insight into the earthquake itself. Informal discussions with taxi drivers, restaurant owners, friends and villagers all indicated the earthquake started with horizontal movements and then shifted to vertical movements. Many respondents indicated that it wasn't until the vertical seismic waves occurred that buildings started to collapse (HI 01-019; 02-004; 05-027). Other phenomena were also discussed, including strange animal behaviour, water receding in the Opak River immediately prior to the earthquake, and increased water turbidity.

4.2.2 Physical and Infrastructural Damages

Due to the location of the hypocentre, soil conditions and quality of construction, there was a high degree of damage to buildings in the affected areas. Unfortunately, many commercial, institutional and residential buildings did not adhere to current buildings standards for the area, with damages and structural failures resulting from low quality building materials, lack of reinforcement structures, and heavy roofs, which caused the collapse of walls during the lateral shaking motions (BAPPENAS et al., 2006; Elnashai, et al., 2007). Private homes in the area were generally constructed with unreinforced brick and mortar, with the mortar having a high sand content (Sarwidi, 2007). Connections to foundations and the roof structure (generally made from timber and slate tiles) tended to be inadequate, particularly for the vertical shaking motions, resulting in the collapse of many roof and wall structures (see Figure 4.4) (Munich Re, 2007). Not only were connections and reinforcements inadequate in many buildings, but the foundations of many buildings were also of poor quality. Sarwidi (2007) found that many foundations were built on unstable soils with improper construction and/or improper soil stabilization.

An estimated 157,000 houses were totally destroyed, with another 202,000 suffering varying degrees of damage, leaving approximately 600,000 - 1,000,000 people homeless and 4.1 million cubic metres of debris (BAPPENAS et al., 2006). The largest damages were concentrated in housing and private sector buildings, with housing accounting for 52% of total losses and damages in the earthquake. Rural areas were particularly hard hit with the districts of Bantul and Klaten comprising 72% of the total housing stock destroyed in the earthquake (BAPPENAS et al., 2006).

Figure 4.4: Structural Failure of Walls and Roofing in Private Dwellings



The education and health sectors were also severely impacted, with high levels of damage to school and health facilities. In Yogyakarta province, 2,155 educational buildings were destroyed or damaged, with over 90% of educational facilities in Bantul experiencing damage or destruction. In Klaten, 38% of educational buildings were destroyed or damaged. In addition, the loss of educational equipment and the death of 36 teachers contributed to the damages to the sector. In the health sector, the majority of health services are provided by private clinics and practitioners and private facilities represented 65% of the losses. In Yogyakarta city, 17 private hospitals were damaged or destroyed, along with one public hospital in Klaten district. In Yogyakarta province, 41 private health clinics, 1,631 private home practices, and 150 health posts experienced some level of damage. In addition, 45 public health centres (PUSKESMAS) were destroyed (representing 38% of all health centres) and another 22 were severely damaged. Damages to health

facilities were significantly less severe in Central Java districts impacted by the earthquake (BAPPENAS et al., 2006). The number of injuries sustained in the earthquake also placed significant strain on the health sector.

In contrast, the impact on non-housing infrastructure was relatively minimal compared to the scale of damage in the housing/building sector. The most significant impacts were in the electricity and water supply sectors. There were damages to the electricity substations that provide electrical power for all affected areas, although electrical links were repaired quickly and electrical networks re-established within a few days in most areas. In terms of water supply, as only a small proportion of the population (less than 10% in the heaviest affected areas) has piped water supplied by the government owned water system (Perusahaan Daerah Air Minum, PDAM), the heaviest damages were associated with private, shallow wells which required cleaning or repair. Relatively minor damages occurred to road and rail networks, although no major disruptions to transportation networks were experienced. The main airport in Yogyakarta (Adi Sucipto airport) experienced damage to the runway and collapse of one of the terminals, although the airport was able to reopen with regular service within two days. There was very limited damage to post and telecommunications infrastructure in the area (BAPPENAS et al., 2006). Table 4.1 provides a summary of the damages sustained in Central Java, Yogyakarta province and Bantul district during the earthquake.

Table 4.1: Summary of Estimated Damages in the 2006 Yogyakarta Earthquake

	Central Java Province	Yogyakarta Province (incl. Bantul district)	Bantul District
Human	1,100 death toll, 18,500 injuries	4,600 death toll, 19,400 injuries	4,100 death toll, 12,000 injuries
Housing	68,414 houses destroyed, 103,689 damaged	88,249 houses destroyed, 98,342 damaged	43,753 houses destroyed, 33,137 damaged
Education	725 school buildings destroyed	2,200 school buildings destroyed (1,900 primary schools)	949 school buildings destroyed
Health	1 hospital, 16 health centres, 56 health posts damaged or destroyed	17 hospitals, 117 health centres, 324 health posts damaged or destroyed	26 health centres and 67 health posts damaged or destroyed
Transportation	relatively minor damage	relatively minor damage	relatively minor damage
Communication	minor disruption	minor disruption	minor disruption
Electricity	few days disruption	few days disruption	few days disruption
Water Supply	minor disruption and few leaks	minor disruption and few leaks	minor disruption and few leaks

Public and Social Facilities	12 social facilities affected, 827 religious facilities damaged	67 social facilities affected, 2,200 religious buildings affected, Prambanan temple heavily damaged	n/a
Business	7,860 SMEs ⁹ affected	21,760 SMEs affected, 6 major hotels damaged	75% of total enterprises affected (including 14,620 SMEs)
Market Facilities	10 traditional markets damaged	85 traditional markets damaged	17 traditional markets damaged

Source: (BAPPENAS et al., 2006)

Total damages and losses sustained in the Yogyakarta earthquake are estimated at \$3.1 billion (US) (Munich Re, 2007). While the majority of heavy damage occurred in the semi-rural areas to the south-east of Yogyakarta city, there was some damage to buildings within the city, although the intensity of ground shaking in this area was lower. Several large buildings that were purportedly built according to building code standards experienced high levels of damage, including Malioboro Shopping Mall, the Ibis hotel, Saphir Square mall and the collapse of the Sheridan hotel foyer (Munich Re, 2007). Much of this damage was a result of either pounding, lateral movement of floors in multi-story buildings or large sections of infill walling falling out of a number of buildings (Munich Re, 2007). The level of damages associated with the magnitude of shaking indicates a high risk of damage in the event of a future earthquake event, particularly within the city of Yogyakarta itself.

4.2.3 Human and Social Damages

As noted in Table 4.1, the earthquake event resulted in the deaths of over 5,700 and estimated 40,000 - 60,000 injuries (BAPPENAS et al., 2006). Destruction and damage of health facilities also exacerbated the difficulty of providing medical care. There were significant disruptions in the provision of education, although the government provided temporary tarpaulins to assist in establishing temporary schools as soon as possible. There was substantial damage to religious centres in both Yogyakarta and Central Java provinces due to the earthquake. Participation in religious activities in the affected areas is high, with a large majority of the population practicing Islam. Over 3,000 places of worship were damaged or destroyed, representing over 20% of all religious facilities in Yogyakarta province. An estimated 1,345 communities (approximately 100,000 families) lost their places of worship. Many of these religious facilities are privately owned and maintained by the community, although the costs of rebuilding would create a

⁹ SME = Small and medium enterprises

significant toll on villagers. As these religious facilities can also serve as centres for community activity and village governance, they play a significant social role in the community (BAPPENAS et al., 2006).

4.2.4 Financial and Economic Damages

Communities in Yogyakarta and Central Java have a high number of small, home-based enterprises, including furniture, ceramics, handicrafts, and food production (BAPPENAS et al., 2006). The majority of these businesses involve self-employment or employ up to three employees (although not necessarily on a full time basis). Approximately one fifth of these businesses are classified as 'poor' with earnings of less than US\$1 per day (Callander, 2007). A series of surveys conducted at various times in the post-disaster context revealed the impact the earthquake event had on economic activities in the impacted areas.

The first preliminary damage and loss assessment report was conducted immediately following the earthquake event through the collaboration of the Central government's National Development Planning Agency (BAPPENAS), the provincial and local governments of both Yogyakarta and Central Java provinces, as well as international NGOs and partners. The assessment estimated that the earthquake destroyed 17,300 formal businesses as well as 12,320 smaller, informal and household-based businesses. Impacted productive sectors employed over 650,000 workers who were directly affected by the earthquake event (BAPPENAS et al., 2006). Business owners suffered losses not only through the destruction of their productive assets (tools, kilns, sewing machines, furniture etc.) but also through the reduced productivity which further impacted income levels (Callander, 2007). In Bantul, close to 75% of businesses were affected (14,600 out of 21,300), whereas in Klaten, 30% of the businesses were damaged (7,900 out of 25,000) (BAPPENAS et al., 2006). A significant number of market facilities were also destroyed in the earthquake. While the largest market in the area was unaffected, a number of traditional markets were damaged and losses were estimated to be around US\$245 million (Callander, 2007).

Follow-up livelihoods surveys conducted in April 2007 determined that up to 80% of entrepreneurs had recommenced their livelihood activities in some form, although almost all were producing at a reduced capacity. Almost half of buildings and assets associated with business activities had not been replaced. Conversely, the draw of competitive wages for both skilled and unskilled labourers

in the reconstruction sector resulted in underemployment in other sectors, including agriculture, garment and textile industries and other manufacturing sectors (Callander, 2007).

The tourism sector was also heavily impacted by the earthquake. As the affected areas are home to important cultural and historical features, these sites provide a significant source of both domestic and international tourism revenues. Affected tourism sites included Prambanan temple (a 9th century World Heritage site) and the old King's Graves in Bantul. Major hotels were also damaged in both Yogyakarta and Central Java province, closing over 700 high-quality rooms, with reconstruction phases lasting anywhere from 3 months to one year. Early estimates immediately following the earthquake indicated RP 36 billion in damages as well as expected losses of income of approximately RP 18 billion (equivalent to \$3.7 million USD and \$1.9 million USD respectively) (BAPPENAS et al., 2006).

Impacts on land used for agricultural cultivation was limited, although damages to irrigation systems, warehouses, processing facilities etc., had significant impacts on the production and distribution of food stuffs. In Yogyakarta province, 14 irrigation systems were damaged, covering 63,124 ha of land and producing 393,800 tonnes/year of rice and 153,700 tonnes/year of *parawija* (other crops such as maize, cassava etc.). 65% of cultivated land dependent on irrigation systems in Yogyakarta province was affected by the earthquake (BAPPENAS et al., 2006). One of the secondary or 'invisible' impacts of the earthquake event involved the agricultural sector, which had been presumed to have fairly low impacts. The UN's Food and Agricultural Organization's (FAO) damage assessment conducted in 2007 found that many farmers had sold their livestock at deeply discounted prices in order to raise funds for reconstruction and other daily living expenses. This left little to no additional capital to purchase farm inputs, leading to significant secondary losses in food and vegetable crops over the long term (Callander, 2007).

The destruction of such a large number of small and medium enterprises (SMEs) was estimated to have resulted in the loss of approximately 130,000 jobs, leading to a 4% increase in unemployment rates in affected areas (from 7% to 11%). Hardest hit sectors included the service industry (workers in the trade sector), industry (construction, manufacturing, utilities and mining) and the agricultural sector (BAPPENAS et al., 2006). Although there were negative impacts on employment, the surge in government and humanitarian funding for reconstruction projects provided a significant source of employment opportunities, although long-term impacts on livelihoods and income levels has yet to be determined (Callander, 2007).

4.3 Yogyakarta Recovery Effort

Shortly after the earthquake, there was tremendous response from various sources, including the Indonesian government, the United Nations, the International Federation of Red Cross and Red Crescent Societies, international donors, as well as various other NGOs and individual/private donations. In the days immediately following the earthquake, the emergency response effort was largely funded through individual and private donations from family members, friends and strangers, as well as local businesses and corporations. These donations included tents, tarpaulins, food, clothing, cash and various other resources (MacRae, 2008). This was followed by donations from various aid organizations and government sources. Aid organizations provided donations of tarpaulins, food, water, cooking resources and cash to the community, thereby providing community governments the role of distributing the goods internally among the villagers (UN-HABITAT, 2008). The national and provincial disaster response agencies (still under the operation of BAKORNAS as BNPB had not yet been established) also provided emergency relief through one-time cash grants of RP 90 thousand per person (approximately \$10 USD), 10kg of rice per person, as well as contributing to the temporary shelter distribution and provision of free medical services (JRF, 2007a; Resosudarmo, Sugiyanto, & Kuncoro, 2008).

The Indonesian government established a coordination team for the two affected provinces along with two provincial implementation teams to facilitate the relief and recovery effort (JRF, 2008; JRF, 2007a). The response from local, national and international donors provided further funds for transitional housing, emergency and relief supplies, as well as longer-term reconstruction and recovery programs. In terms of financial involvement, the largest contributor was the Indonesian government which provided approximately 570 million (USD) for reconstruction activities, followed by the cluster agencies of the UN response which provided approximately 175 million (USD) and the multi-lateral reconstruction fund (Java Reconstruction Fund (JRF)) created through 80 million (USD) in donations from the European Commission, the Netherlands, the United Kingdom, Canada, Finland, and Denmark (Asrianti, 2011; JRF, 2007a; Manfield, 2007). The multi-donor fund was then administered through the World Bank and funding was implemented through the International Organization for Migration (IOM), the Community Housing Foundation (CHF), and the German Technical Cooperation Agency (GTZ) (MacRae & Hodgkin, 2011; E-03).

In terms of the contributions of various coordinated international humanitarian organizations, the Yogyakarta earthquake response was organized using the newly adopted UN cluster system. The

UN cluster approach was implemented in 2005 after a comprehensive review of the global humanitarian system highlighted a number of issues and problems within the international humanitarian response system (IHRS) (MacRae & Hodgkin, 2011). Particularly, a lack of coordination between various agencies and response gaps in the provision of relief and recovery services resulted in a lowered quality of provision of humanitarian services (IASC, 2006). The Inter-Agency Standing Committee (IASC) first adopted the cluster approach in 2005 as part of a wider reformation process occurring in the IHRS with the purpose of improving the effectiveness of humanitarian activities, strengthening partnerships and coordination between various humanitarian agencies, and ensuring greater accountability among these organizations (IASC, 2006). The system is organized around a series of sectors or ‘clusters’, each of which is led by a global agency and an individual leader who acts independently of his/her own organization (MacRae & Hodgkin, 2011). The eleven global clusters and their lead agencies are listed in Table 4.2. This system was first implemented during the Pakistan earthquake response in 2005 and was used for the second time during the 2006 Yogyakarta earthquake response in order to coordinate and manage the large international humanitarian response (MacRae & Hodgkin, 2011).

Table 4.2: UN Global Clusters and Leading Agencies

Cluster	Leading Agency
Logistics	WFP
Nutrition	UNICEF
Emergency Shelter	UNHCR IFRC (acts as a convener during disaster situations)
Camp Management and Coordination	UNDRC (for IDPs from conflict) IOM (for disaster situations)
Health	WHO
Protection	UNHCR (global cluster lead, field-level lead in conflict) UNHCR, OHCHR, UNICEF (decide on leadership for field level in disasters)
Agriculture	FAO
Emergency Telecommunications	OCHA (process owner) WFP (security telecoms) UNICEF (data telecoms)
Early Recovery	UNDP
Education	UNICEF Save the Children Alliance
Sanitation, Water and Hygiene	UNICEF

Source: (Manfield, 2007)

The funds from the UN Cluster System were primarily used during the initial emergency and relief stages in order to provide for the immediate needs of the affected communities. Table 4.3 provides an overview of the evolution of funding provided for each cluster over the 12-month period following the earthquake event. The majority of funding for permanent reconstruction and longer-term livelihood and development initiatives was provided by the Indonesian government and JRF. Although there were smaller concerns related to water, sanitation and health, shelter was designated the primary concern due to the high degree of structural damage and the upcoming rainy season (MacRae & Hodgkin, 2011). The recovery effort initially focused on housing and building reconstruction, followed shortly thereafter with livelihoods rehabilitation and disaster risk reduction initiatives (Manfield, 2007). Each of these sectors is discussed briefly below.

Table 4.3: Evolution of Cluster Funding (in USD)

Cluster	June 2006	September 2006	January 2007	% of Total Funding
Agriculture	700,000	0	895,543	0.5
Coordination	1,500,000	0	8,939,329	5.1
Disaster Risk Reduction	0	0	16,941,829	9.7
Education	320,000	1,650,000	18,520,084	10.6
Emergency Shelter	10,520,497	12,930,355	24,556,285	14.1
Livelihoods	0	400,000	5,687,290	3.3
Health	3,657,265	3,770,909	24,752,817	14.2
Permanent Housing	0	0	14,742,499	8.4
Protection	60,000	1,429,674	3,789,230	2.2
Public Outreach	0	0	2,005,060	1.1
Water and Sanitation	2,776,326	5,759,866	15,608,005	8.9
Training	0	0	419,322	0.2
Shelter and Reconstruction	1,922,410	4,690,814	37,797,012	21.6
TOTALS	21,456,498	30,631,618	174,654,303	---

Source: (Manfield, 2007)

4.3.1 Shelter and Building Reconstruction

As the majority of damages were to private houses and other buildings, shelter and building reconstruction formed the majority of the reconstruction and recovery effort (Manfield, 2007; UN-HABITAT, 2008). The beginning phase of the relief and recovery operation focused on providing emergency and temporary shelter to the impacted households, particularly to accommodate for the upcoming rainy season (generally starting around September/October) (MacRae & Hodgkin, 2011). In the initial stages of the reconstruction effort, there was some uncertainty over whether the government would implement a one-step or two-step approach to permanent housing (UN-

HABITAT, 2008). The one-step approach would provide funding for households to immediately begin reconstruction of permanent housing while living in temporary housing such as tents. The two-step approach would provide funding for transitional housing whereby local materials would be used to build temporary bamboo housing with reusable materials. The transitional housing step would then be followed by the reconstruction of permanent housing, thereby allowing more time for planning and development activities (E-02).

In the end, the government decided to provide funding for the one-step shelter approach whereas the shelter cluster (involving more than 60 member organizations) decided to take the two-step sheltering approach (MacRae & Hodgkin, 2011; UN-HABITAT, 2008). The government position was that it had a limited supply of funds and wanted to ensure that the funding went to permanent housing solutions. The government also believed that the emergency shelters provided were sufficient in terms of temporary housing and that no further funding needed to be allocated to transitional housing. There were also cases of homeowners constructing transitional housing using rubble and other materials. This decision was also influenced by the Aceh experience, whereby the government was on the receiving end of negative criticism related to the amount of time many families spent in transitional housing following the 2004 Indian Ocean Tsunami (E-01; E-02).

On the other hand, the international organizations involved in the recovery believed the two-step housing solution was required in order to provide sufficient emergency shelter that met the international standards set forth in the Sphere handbook, as well as provide communities the time to plan and rebuild housing according to earthquake resistant guidelines. In addition, the upcoming rainy season indicated a need for improved shelter beyond emergency tarpaulins (UN-HABITAT, 2008). The majority of the UN cluster funding used within the shelter cluster was used to provide emergency and transitional shelter to impacted households, including 350,000 tarpaulins, 45,000 clean-up toolkits and 80,000 transitional bamboo shelters (Manfield, 2007). Figure 4.5 depicts typical transitional housing structures in Yogyakarta.

Under the recommendation of various local experts, including the Sultan of Yogyakarta, the transitional shelters were built using local techniques and materials, including bamboo frames and woven walls, as well as tiled roofs (MacRae & Hodgkin, 2011). In some cases, the transitional shelters are still in use over five years after the earthquake, having been repurposed as kitchens, sheds, small shops, workshops, storehouses and small animal enclosures, although the use of untreated bamboo wood has limited the lifespan of the structures (approx. 2 years compared to 25

years for treated bamboo) (UN-HABITAT, 2008). Interestingly, the costs associated with building the transitional shelters in Yogyakarta were approximately \$100 - \$200 USD compared to the delivered costs of providing tents which was over \$300 USD (Manfield, 2007). This provides some financial evidence to support an emergency to transitional shelter approach as opposed to the provision of longer-term transitional tents.

Figure 4.5: Transitional Bamboo Housing in Yogyakarta



Source: (UN-HABITAT, 2008)

In terms of permanent housing, the reconstruction effort took a multi-actor approach. As previously mentioned, the majority of the permanent housing reconstruction effort was funded by the Indonesian government which allowed the construction of 258,000 houses. Initial government announcements in the media indicated that each affected household would receive 30,000,000 IDR (approx. \$3,200 USD) to rebuild their houses, although once the extent of the damage became clearer, the amount was reduced to 15,000,000 IDR (approx. \$1,600 USD). Due to issues with the government system for defining and registering affected households, some households did not receive funding to rebuild their permanent houses (MacRae & Hodgkin, 2011). The non-governmental sector took a “fill-in-the-gap” approach to provide funding for the construction of housing for families who did not receive government funding (Parikesit, 2009). The JRF funded the reconstruction of a further 23,500 houses, whereas a variety of other NGOs provided funding for a small number of additional houses in selected villages (Manfield, 2007).

Over 280,000 homes were rebuilt using a community-driven approach: community consultation and accountability led the government and other organizations to distribute reconstruction funds based on the “community spirit of *gotong royong*, a local tradition whereby families jointly take decisions and build together” (JRF, 2007a, p. 29). Local government leaders were responsible for organizing lists of impacted households who should receive reconstruction funding as well as administering and distributing funding. While the assessment of housing was conducted at the

dusun and *desa* government levels, the distribution of funding for permanent housing reconstruction was organized under the community structure of POKMAS in Yogyakarta (*Kelompok Masyarakat* - Community Groups) and KSMP in Central Java. These neighbourhood community groups consisted of 10 - 12 families whose houses were damaged during the earthquake and were responsible for administering the funding for reconstruction (UGM & IRP, 2009). As much of the building damage was linked to poor quality construction and lack of adherence to building standards, the reconstruction effort attempted to build back with a focus on higher standards of safety and sustainability (JRF, 2008).

4.3.2 Livelihoods Recovery

Although the majority of funding was allocated for housing reconstruction, there was also an effort to rebuild livelihoods and economic activities in the area, although these activities generally commenced later in the recovery program. Livelihoods rehabilitation focused on the small-scale business activities and assets located within the household (i.e. the home-based enterprises) that are typical of the region. As the majority of these small businesses were low-capital, home-based activities, the household reconstruction efforts also provided some assistance in re-establishing these entrepreneurial operations (JRF, 2007a). The most impacted industries included ceramics and pottery, as well as the garment and textile industries.

In order to provide some longer-term assistance to rebuild and re-establish these livelihood activities, a variety of government and NGO programs were initiated in the months following the earthquake. These include the FAO which provided agricultural support to the hardest hit rural communities; the GTZ which provided micro-financing and technical support programs to impacted SMEs, and; AusAID's training program for improving construction skills. The second phase of JRF funding provided support for livelihood programming beginning in June 2008 and was administered through the International Organization for Migration (IOM) and GTZ (JRF, 2008). The focus of these projects was to provide technical and asset-replacement assistance for micro and small enterprises; build capacity through training and expanding market access; enhance access to funding and micro-credit institutions, and; provide loan renegotiation strategies for defaulting lenders (JRF, 2008). In many cases, large INGOs partnered with local NGOs to implement these livelihood programs at the local level (UNDP & BAPPENAS, 2006). Figure 4.6 provides an overview of the various institutions and livelihood programs implemented after the earthquake.

Figure 4.6: Livelihood Recovery Programs

Program	Institution Involved	Notes
Policy/Regulation on Credit Restructuration (No. 8/10/PBI/2006)	Bank of Indonesia	17,712 debentures were restructured, for a total credit market of RP 375 billion
Support program for BPR (Community Credit Bank)	GTZ and local governments	40 BPR in Yogyakarta and 13 BPR in Central Java; total support EUR 500,000/ USD 9.85 million in the form of credit and partnership programs; capacity building program in the form of trainings
Reconstruction program for economic facilities and infrastructure	Central and local government	Traditional market reconstruction, irrigation systems, road improvements
Small and medium-sized enterprises recovery program	Central and local government	RP 105,60 billion in 2006; RP 332,911 billion in 2007 and 2008
Financial and technical assistance for SMEs	International Organization for Migration	
Recovery program directed to improve market networks	Office for Industry and Trade	Assistance for micro-enterprises to maintain their networks with buyers
Direct advocacy and empowerment programs for micro-enterprises	Universities and NGOs	Multiple villages received support for livelihood improvements, including Kasongan, Kotagede and Imogiri

Source: (Setiawan, 2009, p. 37)

A review of the different livelihood programs offered by various government institutions, as well as local and international humanitarian organizations, revealed that the livelihood recovery program focused on the following key initiatives (see IOM, 2011; IOM, 2010; JRF, 2007a; JRF, 2008):

- Capacity building and training activities to develop new skills, particularly in relation to construction and food production
- Provision and establishment of micro-financing institutions to provide support to re-establish damaged business activities
- Provision of assets to support entrepreneurial activities, including kitchen tools, sewing machines, construction tools etc.
- Agricultural support through seeds, fertilizers as well as provision of livestock to support animal breeding programs.

Although one- and two-year post-disaster assessments indicated that up to 95% of small and medium enterprises (SMEs) had recommenced their operations in some form, most sectors experienced a decline in production and sales, with the exception of industries that supported reconstruction efforts (i.e. the furniture sector) (JRF, 2008; JRF, 2007a; UGM & IRP, 2009). Two

years after the earthquake, over half of affected enterprises were struggling to reach pre-earthquake production and income levels (JRF, 2008). This slower pace of livelihoods recovery has been attributed to the emphasis on building reconstruction, funding gaps for livelihoods rehabilitation and delays in implementing livelihoods programs, as well as lower working capital among households in the region (JRF, 2008).

4.3.3 Disaster Risk Reduction Efforts

The earthquake provided the impetus to implement disaster risk reduction programming during the recovery effort, as well as analyze and plan for the numerous other hazards in the area. Arguably, the largest danger is posed from the nearby Mt. Merapi volcano which threatens the immediate area during eruptions and also large surrounding areas through ash fall and lahar flows. Some communities in the earthquake-affected zone are also prone to flooding, landslides, localized storms, and extreme weather events from El-Nino Southern Oscillations (UNDP & BAPPENAS, 2006). Disaster risk reduction (DRR) initiatives were, therefore, implemented as part of the post-earthquake response to focus on the multitude of hazards facing impacted communities in order to promote a more holistic approach to disaster recovery.

The largest component of the DRR initiatives focused on building codes and enforcement of construction standards, including construction skills training, implementing a building permit system in relation to shelter and reconstruction activities, and public education for construction standards (Manfield, 2007). The community-based approach to construction provided individual home owners with increased control and sense of ownership over the construction of their homes, and the major funding agencies (the government and JRF) provided strict controls to ensure the enforcement of building standards in housing construction (JRF, 2008). Major education and training programs, along with public education campaigns, were implemented to teach seismic construction standards and techniques, such as the proper mixtures for cement and sand ratios (UN-HABITAT, 2008). Figure 4.7 depicts an example of the type of educational materials that were distributed during the reconstruction phase.

Other DRR activities included supporting local governments and communities in planning and development strategies to mitigate against future disasters, including earthquakes, flooding and disease, as well as capacity training for local government institutions and disaster management organizations (Manfield, 2007). Particularly, the JRF promoted DRR activities through support of

Community Settlement Plans that focused on the incorporation of hazard and risk assessments into spatial planning initiatives and development strategies to promote safety and improve awareness (JRF, 2008).

Figure 4.7: Example of Construction Training Materials



Source: (UN-HABITAT, 2008)

Public education was also carried out during the recovery period, including newspaper advertisements, radio and television campaigns, and promotion of the inclusion of disaster education in curriculum standards (Manfield, 2007). Long-term capacity building in selected villages was carried out under the IOM's DRR initiative funded by the JRF. These initiatives have established community-based Village Disaster Response Teams, funded the construction of risk mitigating infrastructure and several disaster response simulations to enhance community preparedness and provided an opportunity to engage key stakeholders in the area (IOM, 2011).

Overall, the disaster risk reduction programs implemented during the 2006 Yogyakarta earthquake recovery indicate a promising shift in incorporating a holistic approach to disaster recovery and

DRR activities. The 2010 Mt. Merapi eruption was a reminder of the necessity of strong local institutions for mitigating and responding to various hazardous events, although further time and analysis is required in order to effectively examine the impact of these programs on reducing risk in the area.

4.4 Preliminary Assessment of the Recovery Effort

The 2006 Yogyakarta earthquake recovery is generally considered one of the best reconstruction efforts completed by the humanitarian response system (MacRae & Hodgkin, 2011). Although there has been limited research conducted on the outcomes of the recovery effort, a number of humanitarian organizations have provided reviews and assessments of the post-earthquake recovery programs. The following sections highlight key points from these assessments, particularly focusing on the pre-existing conditions in the region that contributed to a rapid recovery.

Due to the close proximity and time period between the 2004 Indian Ocean tsunami and the 2006 Yogyakarta earthquake, as well as the fact that many of the aid organizations, individual aid workers and Central government officials were involved in both recovery efforts, there have been many comparisons made between the speed and effectiveness of both programs. Organizations and government officials were aware of the perceived failures of the tsunami recovery in Aceh and proceeded cautiously in Yogyakarta (MacRae, 2008). Many of the lessons learnt from the Aceh experience were implemented in the Yogyakarta recovery effort, including the one-step housing solution by the government, the implementation of the multi-donor fund, and a community driven approach to recovery (MacRae & Hodgkin, 2011; Parikesit, 2009). Although there are several lessons learned that were implemented in Yogyakarta, it would also be prudent to remember the differences in damages to infrastructure, the degree of human losses, social structure, social capital and government capacity, as well as the differing international responses to each event.

The initial relief and early recovery phase of the response effort after the 2006 Yogyakarta earthquake was relatively quick to transition into long-term recovery and reconstruction activities. There are several reasons for this fast transition and recovery rate, specifically due to levels of damage, deaths and displacement, as well as strength of government and social institutions in the affected area. Although there was high damage to houses and buildings, there was limited damage

to road and communications infrastructure, easing the planning, assessment and delivery of aid and assistance (MacRae & Hodgkin, 2011). The numbers of deaths and injuries were also comparatively low (compared to the extent of damage and also compared to the losses in Aceh after the 2004 tsunami) resulting in lower levels of trauma and increased availability of human resources for reconstruction (Manfield, 2007).

The semi-rural location of many of the impacted communities allowed many households to remain in their villages, limiting the need for IDP camps (UN-HABITAT, 2008). The impacted populations also tended to shelter in place, either on their land beside destroyed houses or within neighbourhood and village tents. This led to reduced conflicts over land tenure and allowed for community-based response mechanisms to begin functioning almost immediately following the earthquake (Manfield, 2007).

Local and provincial government institutions in both Yogyakarta and Central Java provinces were largely unaffected by the earthquake event, allowing for a strong government response in impacted areas (Manfield, 2007). Although both areas have strong governments within the context of Indonesia, compared to Central Java province, Yogyakarta province has a stronger and more credible government system. This resulted in lower levels of corruption compared to Central Java, which overall experienced a slower and less effective recovery (MacRae & Hodgkin, 2011). The fact that many Yogyakarta government officials lived in the impacted areas and had their houses destroyed may have also helped to develop a commitment to effective recovery.

Due to the relatively low number of deaths, the social institutions in the impacted regions were largely unaffected by the disaster. The community spirit of *gotong royong* as well as a self-help culture with limited aid dependency in the area resulted in strong household, village and community involvement in the recovery process (Manfield, 2007; UN-HABITAT, 2008). High levels of participation in community and village organizations, including women and youth groups, helped provide systems for mutual aid and collective recovery (MacRae & Hodgkin, 2011). The impacted areas also comprise part of the Java construction industry, primarily centred in Yogyakarta city. A larger proportion of the affected population was employed by the construction industry, contributing to easy access to human and material resources required for the reconstruction effort (Manfield, 2007; UN-HABITAT, 2008).

The geographical location of affected areas also impacted the speed of recovery. Heavily damaged areas were located in close proximity to the city of Yogyakarta (which was only slightly affected), facilitating the process of aid delivery (MacRae, 2008; Manfield, 2007). As well, Yogyakarta city is a centre of higher education, with over 90 Universities, resulting in both a high response from student volunteers as well as large degree of expertise in technical, cultural and management issues. Yogyakarta is also considered the cultural capital of Indonesia, resulting in an increased interest and commitment at the national level in terms of response and recovery (MacRae & Hodgkin, 2011).

Another factor that impacted the initial response effort was that many aid organizations were already positioned and prepared to work in the area. The April/May 2006 threat of an imminent eruption from nearby Mt. Merapi had led humanitarian organizations to stockpile resources and supplies in the area, including over 10,000 tarpaulins and several fully functioning offices (UN-HABITAT, 2008). Many of the organizations and humanitarian practitioners involved in the Yogyakarta earthquake response had experience working in both the Aceh tsunami recovery as well as the Pakistan response using the UN cluster system, perhaps resulting in greater coordination and knowledge of the local conditions (MacRae & Hodgkin, 2011).

Some authors suggest that the conditions that existed just prior to the Yogyakarta earthquake provided an opportunity for quick and effective disaster recovery, conditions which are generally not present in most post-earthquake disaster response environments (Manfield, 2007). Positive assessments of the disaster response after the earthquake focused on the speed and cost of recovery, particularly in comparison with the recovery effort in Aceh. Most of the permanent housing reconstruction effort was finished within two years and initial delivery rates of emergency and temporary shelters was much faster compared to other disaster events (MacRae & Hodgkin, 2011). The reconstruction effort in Yogyakarta was able to rebuild almost 300,000 permanent houses with approximately 800 million USD in funding, compared to the Aceh recovery effort which was supported by USD 6 billion (MacRae & Hodgkin, 2011). The provision of shelter is generally considered more culturally appropriate and funding was implemented using a community based approach, whereby local villagers were involved in the process of distributing funding and organizing the reconstruction effort (MacRae & Hodgkin, 2011).

While there is a predominantly positive portrayal in publications assessing the recovery effort after the 2006 Yogyakarta earthquake, several criticisms that do appear in articles and reports generally

focus on the behaviour of NGOs and how the aid effort was organized and implemented. Criticisms include: the lack of coordination between the different cluster sectors; lack of participation by some agencies in the cluster system; the inconsistent use of language and translation during meetings that impacted the level of involvement of local NGOs and organizations; the complexity of Indonesian government levels and changing policy approaches, and; levels of flexibility within the framework of the UN cluster system (MacRae & Hodgkin, 2011; MacRae, 2008; UN/OCHA, 2007). Other criticisms suggest there was a late and lowered focus on livelihood rehabilitation initiatives (MacRae & Hodgkin, 2011; Manfield, 2007).

4.5 Summary and Conclusion

Chapter four has provided an overview of the historical, political and legal framework in which the 2006 Yogyakarta earthquake event occurred. The chapter summarized the political history of Indonesia, particularly highlighting the Suharto era dictatorship to demonstrate how a culture of corruption has been transferred down to local government levels during the decentralization process. Furthermore, an overview of the legal framework that is currently in development in Indonesia for responding to disaster events was covered: this legal framework was required in order to respond to the large number of hazards the country faces in conjunction with high levels of social vulnerability. This information is important to understand the context in which the 2006 Yogyakarta earthquake recovery occurred as well as the decisions and responses from local villagers.

This chapter also provided an overview of the damages and losses associated with the 2006 Yogyakarta earthquake event along with a summary of the corresponding recovery effort. High levels of damages, particularly building damage, were rebuilt within a short period of time using a community-based and owner-driven process of reconstruction using cultural capacities such as *gotong royong*. A summary of some of the pre-existing conditions highlighted several reasons why the recovery effort was successfully able to reconstruct a large number of permanent dwellings in a short period of time, including low levels of infrastructural damage, pre-existing governance and response capacities in the region, high levels of participation among skilled construction labourers in the area and experience of humanitarian practitioners who were involved in the reconstruction effort in Aceh after the 2004 Indian Ocean tsunami.

While the reports and assessments conducted by the various government and international organizations provide a predominantly positive portrayal of the recovery effort after the 2006 Yogyakarta earthquake, a more in-depth, holistic assessment of the recovery effort is required in order to ascertain whether the recovery effort has successfully implemented a resilient disaster recovery approach that has improved the overall conditions of the community and led to reduced vulnerability and increased capacity to cope with future disaster events.

5.0 CASE STUDY SITES

The 2006 Yogyakarta earthquake provides an opportunity to explore long-term disaster recovery and refine the conceptualization of resilient disaster recovery. This case study site has been selected for three main reasons. First, the earthquake had a tremendous impact on livelihoods and during the recovery effort there was a partial focus on post-disaster livelihood rehabilitation (BAPPENAS et al., 2006; Callander, 2007; JRF, 2008). This provided an important opportunity to explore the intersections between the three concepts used as the basis for defining resilient disaster recovery.

The Yogyakarta earthquake also provides an opportunity to explore long-term recovery in the context of a shifting approach to mitigating disasters in Indonesia. The disaster occurred shortly after the 2004 Indian Ocean tsunami, which attracted unprecedented international coverage and assistance and also highlighted the importance of effective long-term disaster recovery. The Yogyakarta earthquake recovery effort also occurred in the shadow of some of the well-publicized failures of the Aceh recovery (MacRae, 2008; Parikesit, 2009). A large number of recovery practitioners from government and humanitarian organizations were involved in both the Aceh and Yogyakarta recovery efforts, allowing a second chance for practitioners to implement the lessons learned from the Aceh experience (MacRae & Hodgkin, 2011). The recovery effort was also an opportunity for UN cluster organizations to further refine and implement the cluster system for recovery. With many of the same practitioners involved in the 2005 Pakistan earthquake recovery (the first time the cluster system was used), the Yogyakarta relief and recovery operation provided a further opportunity to implement lessons learned (Manfield, 2007). As well, the disaster occurred within the context of increasing recognition from Indonesian government officials of the need to implement a legal framework for disaster management, as well as implement disaster risk reduction initiatives, as opposed to simply rebuilding communities to their previous form (James, 2008). All in all, the Yogyakarta earthquake provides an important case study site to explore and analyze resilient disaster recovery occurring within a context of learning and change with the hopes of increasing the effectiveness of recovery and risk reduction initiatives.

Finally, the timing of the earthquake and subsequent research is important: the earthquake occurred in 2006 and the timeline for field research was 2010 – 2011, allowing for 4 – 5 years of post-disaster reconstruction efforts to unfold before research commenced. Many scholars have noted the long-term nature of post-disaster rebuilding and having at least 4 – 5 years between the disaster

event and the research is thought to be ideal: the majority of reconstruction projects have been completed and many organizations have left the area or are phasing their work into longer-term development initiatives (Edgington, 2010). Consequently, the Yogyakarta earthquake case study provided an appropriate timeline to assess the long-term effectiveness of these reconstruction efforts and to indicate where improvements might be possible, based on the preliminary conceptualization of resilient disaster recovery.

While the previous chapter provided an overview of Indonesia's political history and the legal framework for disaster response, chapter five highlights the smaller scale conditions and characteristics of the impacted regions in order to provide contextual information on the demographic, cultural and political characteristics of the region. This is followed by an overview of the selected village sites, including a summary of how these villages were selected for inclusion in the research.

5.1 Yogyakarta and Central Java Provinces

Java Island is divided into six administrative units, including four provinces (Banten, West Java, Central Java and East Java), one special region (Yogyakarta Special District (DIY)), and one special capital district (Jakarta). The 2006 Yogyakarta earthquake affected the provinces of Yogyakarta and Central Java, including all five districts in Yogyakarta province (Bantul, Sleman, Gunung Kidul, Yogyakarta and Kulonprogo) as well as six of thirty-six districts in Central Java province (Klaten, Magelang, Boyolali, Sukoharjo, Wonogiri, and Purworejo). Of these eleven districts, six experienced heavy impacts, including all five districts in Yogyakarta province and Klaten district in Central Java province (BAPPENAS et al., 2006; Resosudarmo, Sugiyanto, & Kuncoro, 2008).

At the time of the earthquake, the combined population of the six districts heavily impacted by the earthquake was 4.5 million, with an average population density of approximately 1,000 people per km² (Resosudarmo, Sugiyanto, & Kuncoro, 2008). Yogyakarta province has a population of more than 3.2 million, and is one of the most densely populated provinces in Indonesia, with an average density of 1,047 people per km² (Resosudarmo, Sugiyanto, & Kuncoro, 2008). Central Java province comprises a much larger area, representing approximately one quarter of the area of Java Island, although only a small area of the province was impacted by the earthquake. While the province had a population of almost 32 million in 2005, the population in Klaten, the district

suffering the most severe impacts from the earthquake, had a population of just over 1 million people (Marfai, et al., 2008). The two hardest hit districts, Bantul and Klaten, have population densities of 1,620 and 1,736 respectively: this ranks both districts in the top ten for population density across all of Indonesia (for so-called ‘non-urban areas’) (BAPPENAS et al., 2006).

Across the areas impacted by the earthquake, 880,000 of the 4.5 million residents (approximately 20%) have been classified as poor (BAPPENAS et al., 2006; Resosudarmo, Sugiyanto, & Kuncoro, 2008). While the poverty rates in Bantul are slightly lower, at 18.5%, Klaten has higher poverty rates with 23.3% of the population classified as poor. Average GDP levels in Bantul and Klaten are less than 50% of national averages, with Klaten ranked among the poorer districts in Indonesia (BAPPENAS et al., 2006).

5.1.1 Rural-Urban Community Structure

Yogyakarta and Central Java provinces can be characterized as exhibiting many features of what McGee (1991) referred to as the ‘*desakota*’ (i.e. village-town) phenomenon. In Java, as in many parts of Asia, the division between urban and rural has become blurred, with rural villages becoming progressively more interconnected and interlinked with urban areas, economically, technologically and culturally (Moench & Gyawali, 2008). Within the context of Asia, many of these urbanizing rural areas are located in the peri-urban regions of urban centres, but instead of rural migration to the urban core, these rural villages are experiencing a shift in social and economic activities, with an intense mix of both agricultural and non-agriculture livelihoods (Xie, Batty, & Zhao, 2005). These urbanizing rural villages exhibit traits of both urban and rural environments and have become increasingly linked to national and international economies, resulting in significant transformations within the village sites themselves. This urban/rural phenomenon was termed ‘*desakota*’ by McGee (1991) who used the Bahasa Indonesian words for village (*desa*) and town (*kota*). McGee (1991, p. 4) defines the *desakota* phenomena as:

Distinctive areas of agricultural and non-agricultural activity [which] are emerging adjacent to and between urban cores, which are a direct response to pre-existing conditions, time-space collapse, economic change, technological developments, and labour force change occurring in a different manner and mix from the operation of these factors in the Western industrialized countries in the nineteenth and early twentieth centuries.

Some of the key features of *desakota* systems include increased physical, electronic and cultural connectivity; increased penetration of the cash economy with declining remnants of reciprocity mechanisms; mixed livelihoods drawing upon local and non-local service and manufacturing opportunities; increased diffusion of modern production and resource extractive technologies; and tensions between formal and informal and traditional institutions for resource management (Desakota Study Team, 2008, pp. 12-14). The *desakota* characteristic of Yogyakarta and Central Java is thought to have had a tremendous impact on the overall recovery of impacted villages due to increased economic and social connections with Yogyakarta city, changing livelihood strategies, and the nature and availability of social and human capital used in the reconstruction process.

5.1.2 Government Structure

In Yogyakarta and Central Java provinces, along with the majority of Indonesia, communities are divided into a series of administrative units within which various government roles and activities are funded and implemented. As mentioned in the case study chapter, a process of decentralization of government services has been in place in Indonesia since 2001 (Vickers, 2005): the roles and responsibilities that once belonged to the Central and provincial governments had been shifted down to local government levels (Parikesit, 2009). In terms of government structure, Table 5.1 highlights the administrative divisions in Indonesia, noting that for some levels there is a difference in terminology for urban and rural administrative units.

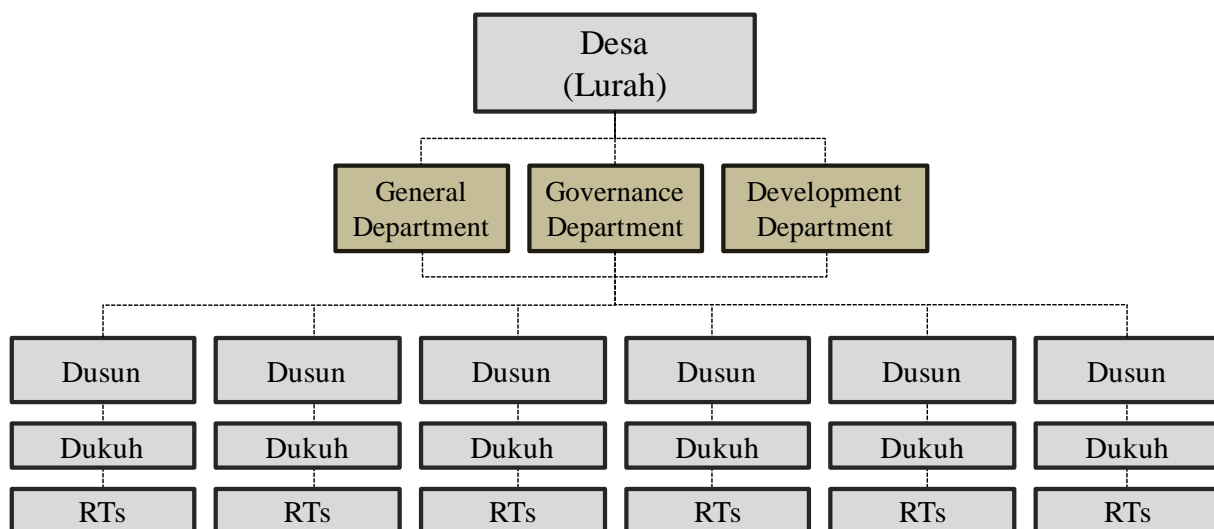
Table 5.1: Administrative Divisions in Indonesia

Government Level	Leader title	English equivalent
Central Government	Presiden	Nation
Propinsi	Gubernur	Province
Kabupaten (rural) / Kota (urban)	Bupati / Walikota	District/Regency
Kecamatan	Camat	Sub-District
Desa (rural) / Kelurahan (urban)	Lurah	Municipality
Dusun	Dukuh	Village
Rukun Tetangga (RT)	Kepala RT (Bapak RT)	Neighbourhood
Kepala Keluarga (KK)	n/a	Household

The four official levels of government administration are the province, district, sub-district and municipality, although the *dusun* and *RT* units are heavily involved in the implementation and administration of government funding and programming (Mei & Lavigne, 2012). Although these levels of government are used throughout Indonesia, there is a slight difference in the implementation of governance structures at the municipal level between Yogyakarta and Central

Java provinces. While similar municipal departments exist in both provinces, the scale at which programs are administered and the responsibilities of leaders in the villages are different. In Yogyakarta province, the lowest level of government administration is at the level of the *dusun*: this is the scale at which most government programs are implemented by the local village leaders. Each village has an elected *dukuh* who is responsible for administering programs within the village, working in cooperation with the *RT* leaders (CM-01; CM-02; CM-04). The local government hierarchy is highlighted in Figure 5.1.

Figure 5.1: Municipality Hierarchy Structure in Yogyakarta

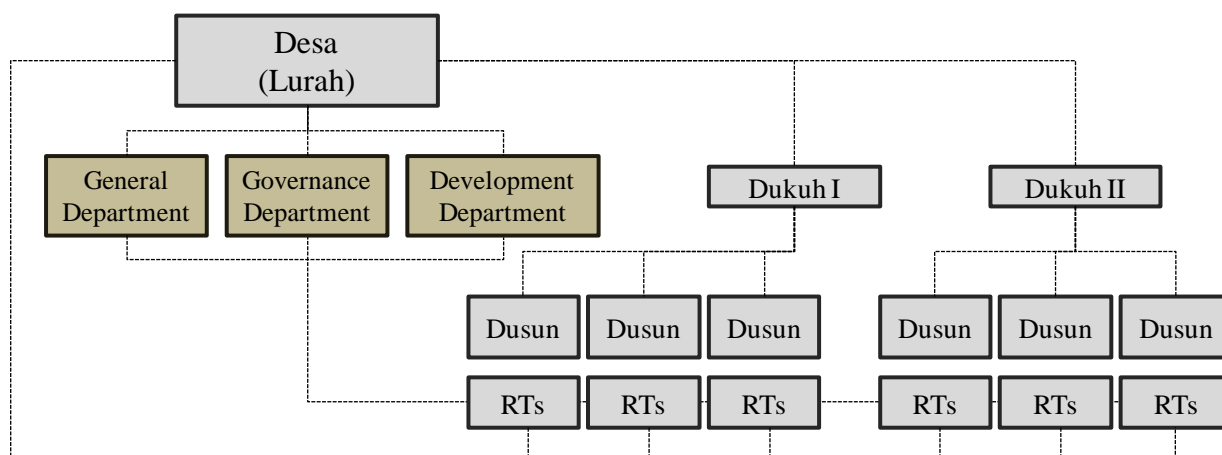


Source: (CM-01)

In rural administrative units in Central Java province however, the scale at which programs are implemented is at the municipal level, rather than the village level as is the case in Yogyakarta province. In Central Java, municipalities are organized around a minimal hierarchy structure: there is one leader of the municipality (*desa*) who works alongside the three departments highlighted in Figure 5.2 (the general department, the governance department and the development department). There are only two *dukuhs* who each have responsibility over multiple *dusuns*, although this position is more symbolic in nature (these leaders are also referred to as *kadus*) (CM-05). The neighbourhood *RT* leaders work in conjunction with the *lurah* and municipal government departments to implement programs and disseminate information. Thus, the *lurah* has direct contact with the *RT* leaders as opposed to the *dukuhs*, although the *dukuhs* are involved in official meetings and communications (CM-03; CM-05).

Governance structures played a role in the recovery effort in terms of how government and NGO funding was organized and the roles of various governance institutions in implementing the recovery programs. This also played a role in terms of implementing the research, as different scales of analysis were used in each province (to be discussed in further detail below).

Figure 5.2: Municipality Hierarchy Structure in Central Java Province



Source: (CM-03, CM-05)

5.1.3 Culture and gotong royong

As a cultural centre for traditional Javanese arts and the site of the ancient temples of Borobudur and Prambanan, Yogyakarta and Central Java provinces are an important historical heritage area in Indonesia. Yogyakarta province is one of five special provinces in Indonesia as it is still ruled by a sultanate whose lineage dates back to the 16th century (BAPPENAS et al., 2006). Traditional Javanese beliefs and customs are still commonly practiced, although in more recent times, particularly in urban areas, there is evidence of some intermixing of individualistic, Westernized cultural trends (Forshee, 2006).

One of the key cultural components that has relevance for the earthquake recovery effort is the traditional Javanese concept of *gotong royong*. *Gotong royong* is one of the core tenets of Indonesian society and can be defined as the spirit of mutual assistance among neighbours, particularly operating at the scale of the village in rural areas (Lamoureux, 2003). While *gotong royong* has been described as engagement in community activities for mutual benefit, others argue that the spirit of *gotong royong* is more of a philosophical approach:

Gotong royong in the strict sense can be rendered as collective social activities. But the deepest meaning of *gotong royong* can be explained as a philosophy of life that takes the collective life as the most important (Bowen, 1986, p. 546).

Within Indonesia, the spirit and principles of *gotong royong* have been adopted and institutionalized, particularly at the local level. Economic cooperatives and monthly *kerjabakti* activities (cleaning of neighbourhood and improvement of environmental quality) have been organized under the spirit of *gotong royong*. Public health activities administered by the Health Department are administered through *gotong royong: posyandu* are run by the women in the community to provide public health services for pregnant women, as well as infants and children under 5 years of age. Community governance structures have also incorporated the spirit of *gotong royong* through neighbourhood associations (RT/RW), youth organizations (*karang taruna*), the community board of trustees (*Badan Keswadayaan Masyarakat (BKM)*), as well as neighbourhood security systems (*siskamling*) where community members engage in nightly patrols (Asian Disaster Reduction Center and International Recovery Platform, 2011).

The spirit of mutual support facilitated both the initial relief effort as well as the longer term reconstruction process through the provision of labour to clear rubble and debris, construct temporary and permanent housing, as well as facilitated the consultation process and community involvement in the planning and decision making process (Asian Disaster Reduction Center and International Recovery Platform, 2011). Due to the nature of the earthquake, with low human casualties compared to the 2004 Indian Ocean tsunami, and the ability of villagers to shelter-in-place, there was minimal break-down of communal social structures. Villagers, governments and NGOs were able to take advantage of the strong spirit of *gotong royong* found in the impacted areas (Manfield, 2007; MacRae & Hodgkin, 2011).

In terms of religion, the people of Yogyakarta and Central Java are almost exclusively Muslim, with over 95% of the population practicing Islam (Lamoureux, 2003). Although the majority identify as Muslim, Javanese culture maintains a mix of animistic and Hinduistic beliefs: traditional Javanese myths and mysticism pervade the culture in Central Java and particularly Yogyakarta. Due to the geological conditions of the region, the Javanese have developed and maintained an “intense relationship with volcanoes and hazards” (Donovan, 2010, p. 118). Disaster events are frequently viewed as some type of test or punishment by God; this punishment is usually related to various activities such as littering, deforestation, bad character, angering the spirits, poor treatment of the earth etc. In many cases, disaster events are viewed as pre-destined

events, with villagers believing there is either a) little that can be done to mitigate the disaster, or b) the disaster can be mitigated through spiritual activities (Schlehe, 1996). Thus, these cultural/traditional beliefs can be seen, in some cases, to contribute to overall vulnerability levels through the refusal of communities to accept the official, scientific warnings or to attempt to take steps to reduce disaster risks. In other cases, the experiences with reoccurring disaster events has led to cultural beliefs and traditions that may provide protections, and reinforce the dangers associated with particular hazardous events (Donovan, 2010). This is explored in further detail in the cultural capital section in chapter six.

5.2 Selecting Village Sites

In order to conduct the research, it was necessary to select several village sites that would provide useful data regarding livelihoods, vulnerability and resilience in the post-disaster recovery period. A range of experiences in the post-disaster period was desired, with the hope of collecting data that spanned a continuum from a) villages that felt the recovery was successful, where attempts were made to improve overall conditions; versus b) villages where recovery was not as successful and there were limited or even negative changes. Thus, villages were selected among a range of following criteria:

1. High degree of damage (over 90% of houses were damaged or destroyed);
2. Preliminary assessment of the village indicating some form of resilience and adaptive transformation or continued levels of vulnerability, or a range between the two options;
3. Villages exhibiting characteristics or experiences that would provide data on the role of identified vulnerability and resilience factors, such as internal/external social networks, role and strength of village institutions, leadership qualities, education levels, income levels/type of income source etc.;
4. Villages that experienced livelihood intervention and long-term development programming compared to villages that experienced limited to no livelihood initiatives during the post-disaster recovery period;
5. Willingness of the village to participate and provide support throughout the research process.

Due to the high degree of damages in Bantul and Klaten, the decision was made to focus on these two districts for data collection. A total of twelve villages were visited for initial assessments and pilot meetings and discussions were held with local village leaders as well as villagers, before

selecting suitable village sites. The precise method for selecting initial village sites was slightly different in Bantul and Klaten. In Bantul, initial *desas* were targeted based on the assessment of damages conducted in the immediate aftermath of the earthquake. As one of the main criteria for selecting villages was a high degree of experienced vulnerability, *desas* were selected based on levels of housing and building damage and areas with over 90% of buildings and houses destroyed were targeted. Once *desas* had been selected, *dusuns* were selected for initial site visits based on village connections with research assistants and Gadjah Mada University, as well as through discussions with village leaders and villagers about other potential village sites. In Bantul, a total of eight *dusuns* were visited during the initial selection period. Four of these were chosen due to connections with one of the research assistants and the university, two were chosen due to recommendations by villagers, and two were chosen due to recommendations from village leaders. Of these eight villages, three were selected for the final research as they met the selection criteria outlined above.

In Klaten, an initial meeting was held with a government officer responsible for organizing relief and recovery activities in the district. The government officer recommended three possible *desa* locations based on the criteria outlined above. These *desa* were then contacted and initial meetings and tours were completed. One additional *desa* was recommended by the *lurah* in one of the initial *desas* visited. Of these four *desa*, two were selected for participation in the final research.

Due to the aforementioned differences in government structure and program implementation at the *desa* and *dusun* structure in Klaten and Bantul, the decision was made to collect data at the *desa* level in Klaten as opposed to the *dusun* level in Bantul. The preliminary method for choosing the scale of analysis was to target self-defined ‘communities’. While communities can be defined through the borders of government administrative units, or some form of spatial unit, they can also be defined through broader categories in which people feel a sense of belonging (Buckle, 1998). In this research, a community or village is defined as an area that local residents feel a sense of belonging, as well as through the government structure and methods for implementing projects. Stated simply, in order to target ‘communities’, it was necessary to conduct analysis at a slightly different scale in Bantul and Klaten. It is also important to note that these were the key individuals and government structures that were involved in implementing relief and recovery activities in the post-disaster period. Therefore, attempting to impose a rigid scale of analysis and focusing solely on the *dusun* level in both provinces would have excluded the government structures and

institutions responsible for implementing local level recovery and development initiatives in Klaten. The difference in the scale of data collection in Bantul and Klaten did not appear to have any significant impacts on the results of the research.

For the data collection in Klaten, as the *desas* were much larger, there was greater difficulty in terms of selecting households for village interviews. In one *desa*, the *lurah* indicated that all eight *dusuns* and *RTs* were fairly similar in terms of levels of education, types of employment, levels of damage and recovery experiences. There was also less geographical distinction between the different *dusuns* and most programs were initiated at the *RT* level. Thus, three *RTs* were chosen for data collection - these were selected based on the number of households (*KKs*) in each *RT*, in that the larger *RTs* were selected (some *RTs* were quite small with less than 10 *KKs*). In the second *desa* in Klaten, the *dusuns* were fairly distinct and separate geographical locations and local government officials indicated that two of these *dusuns* experienced a much higher degree of damages. As one of the *dusuns* had a smaller number of households (approximately 40), the decision was made to conduct household interviews in both *dusuns*.

5.3 Selected Village Sites

Overall, data were collected in five villages¹⁰, three in Bantul district and two in Klaten district. Two of the villages (one in Bantul and one in Klaten) were selected due to their initial assessment as exhibiting high vulnerability and a lack of transformation and resilience features following the earthquake. Two villages (one in Bantul and one in Klaten) were selected due to their attempts to transform and improve livelihoods and standards of living following the earthquake. These two villages also had strong leaders who each attempted to implement changes following different trajectories. The final village (in Bantul) was selected due to its semi-urban characteristics, a higher standard of living and education levels, as well as a faster recovery time. This village also had a unique set of institutions within the village, which are discussed in further detail below. Table 5.2 provides an overview of the five selected village sites, including the number of households and population levels, as well as an overview of the impacts from the earthquake disaster (data from interviews with government leaders in each village).

¹⁰ The term village will be used throughout the remainder of the paper to describe the different sites where research was conducted. Although this term does not accurately reflect the different scale of analysis between Klaten and Bantul, the term sufficiently captures the nature of the areas under study and is used for the sake of simplicity.

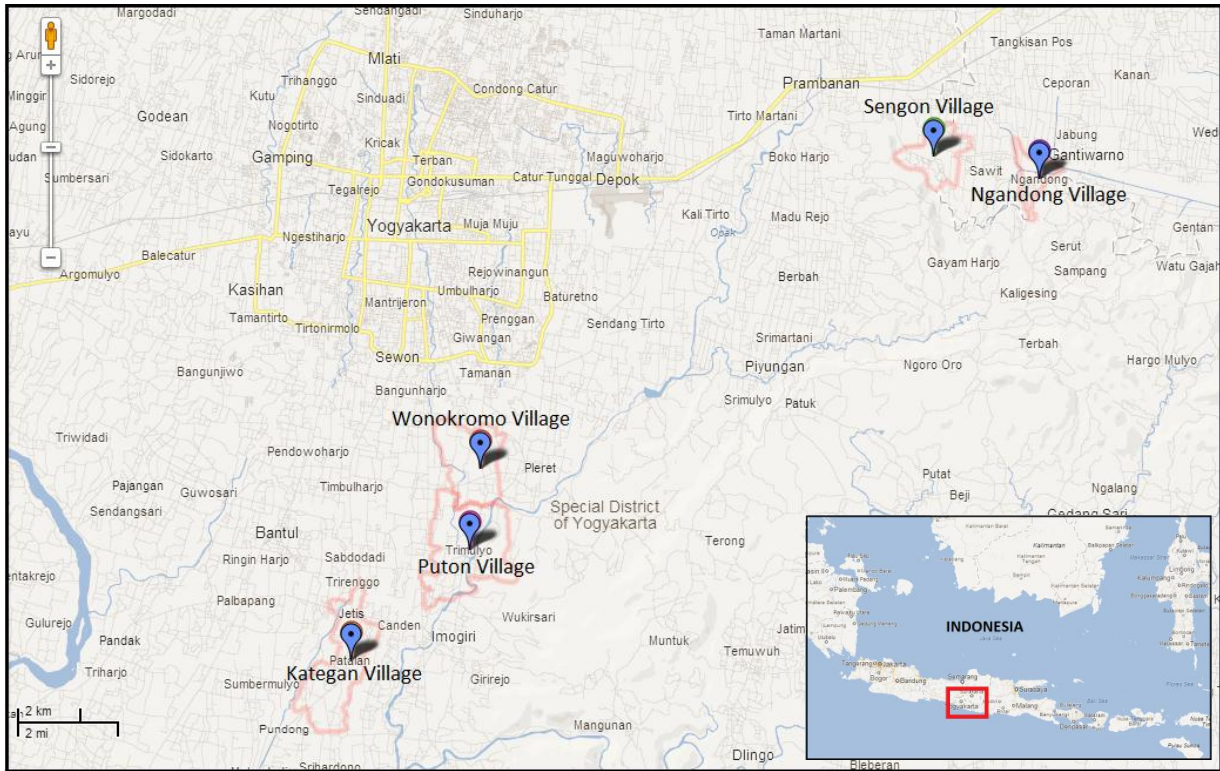
Table 5.2: Characteristics of the Case Study Villages¹¹

Village	Puton Bantul District	Kategan Bantul District	Wonokromo I Bantul District	Ngandong Klaten District	Sengon Klaten district
Size of Village	70 hectares total	12 hectares for housing/gardens 16 hectares for rice paddies	n/d	n/d	n/d
Number of Households	350	216	325	900	220
Total Population	1228	678	900	n/d	900
Total Males	602	328	n/d	n/d	n/d
Total Females	626	350	n/d	n/d	n/d
Total Children	107 children under 5 years 194 children aged 6-18 years	153 children aged 0 - 15	115 children under 5 years	n/d	n/d
Total Adults	927 (above 18 years)	525 (above 15 years)	n/d	n/d	n/d
Employment	Majority are working as construction or farming labourers or in factories	Majority are working as farming labourers. Other positions include pedicab drivers, construction labourers or in factories	Although some farm labourers, 80% have formal employment (i.e. government officers and teachers)	Majority are working as farming and construction labourers	90% are working as construction and farming labourers
% of Houses Destroyed in EQ	98%	100%	Over 90%	Over 99%	n/d
Deaths	26	18	7	26	n/d
Injuries	100	90% injured (60% seriously)	n/d	n/d	n/d

The following sections provide an overview of each of the villages selected for study in this research. The purpose of these sections is to provide sufficient background information on each village in order for the reader to have an understanding of the similarities and differences between each village, as well as the recovery experiences of each village after the 2006 earthquake. Another purpose of these sections is to share the information about the village that leaders and community members felt was important to share about their villages. This provides an opportunity for both leaders and villagers to disseminate information they felt was important about the characteristics, history and conditions of their villages. Figure 5.3 outlines the geographical location of each of the village sites in Bantul and Klaten districts.

¹¹ The denotation “n/d” refers to “no data”

Figure 5.3: Map of Village Sites in Bantul and Klaten Districts



5.3.1 *Puton*¹²

Puton dusun is located in *Trimulyo desa*, *Jetis kecamatan* in Bantul. Located on the banks of the Opak River, the village is at risk from earthquakes, flooding and small-scale storms. With a population of approximately 1200 people, Puton is one of the largest villages selected for this research. The predominant occupation in the village is farming and construction, with the majority of villagers engaged in one or both of these livelihood activities. Construction labour positions are almost exclusively male income activities, whereas farming and agricultural occupations are held by both males and females. Puton is one of the poorer villages in the district, although recent projects conducted with Gadjah Mada University as well as universities in Japan and South Korea have resulted in positive development impacts for the village. Average education levels are fairly low although the younger generations tend to complete high school. Unemployment in the village is quite high, with many of the male construction labourers indicating that there is scarcity of jobs in the post-earthquake reconstruction period. As with most villages, the majority of houses are

¹² Information in this section is derived from household interviews #01-001 to 01-025, FG-01, CM-01

located in close proximity to each other, creating a core residential area that is surrounded by agricultural land. Figure 5.4 includes photographs of the village and surrounding areas.

Figure 5.4: Photographs of Puton Village



a) Main road and housing in Puton



b) Agricultural fields surrounding residential areas



c) Mix of housing and animal husbandry activities



d) Density of housing in residential area

During the earthquake, there were 26 deaths, including the *dusun* leader, the *dukuh*. Many of the injured and killed were elderly or small children. After the disaster there was no electricity and over 90% of the houses were totally destroyed (only 5 houses remained standing). For one week the people were living in community tents although there was little food, heavy rain and the area was inundated with snakes. Due to the death of the village *dukuh*, there was a lack of leadership in the aftermath of the earthquake, although one of the villagers (*Ibu X*) took the role of the village leader and facilitated the distribution of aid and reconstruction funding. For the following three years there was no village *dukuh*, although the role was assumed by *Ibu X*. Although the community invited *Ibu X* to become the village *dukuh*, she declined the position as she was already employed by the Central government. Instead, the community requested that her husband take the role of *Pak dukuh*, which he accepted, and he fulfills the administrative component of the village leaders' position. *Ibu X* maintains a community leadership role and is heavily involved in

development programming in the village. For Puton village, when reference is made to the village leader, this is referencing *Ibu X* as opposed to *Pak dukuh* due to the nature of her involvement and leadership role in the community.

During the first two to three weeks of the initial emergency period (i.e. the initial relief and early recovery operations) in Puton village, there was limited assistance provided to the village. Villagers received small donations and personal assistance from other communities and friends/family from other areas (while some personal donations were kept for the individual family, many families shared personal donations with their neighbours and fellow villagers). After a short period of time, there was assistance in terms of larger food donations and health services from the government and large organizations such as USAID, although there was limited coordination in terms of how this assistance and aid was to be distributed. After approximately three months, the villagers received shelter assistance in the form of transitional bamboo shelters from foreign aid organizations. The majority of these bamboo houses were constructed using *gotong royong* to share labour resources. Approximately six months after the earthquake, the villagers received funding from higher level government sources in order to begin the reconstruction of permanent housing. Each household considered in the heavy damage category received 15 million Rupiah (RP) (approximately \$1,600 USD) to rebuild their houses. As the RP 15 million was insufficient to build a house, some community members used *gotong royong*, although many households chose to pay labourers from outside Puton due to labour shortages (HI 01-020). By the end of 2007, all the houses in Puton village had been rebuilt.

As with all villages studied, there was a donor-driven focus on building earthquake resistant housing in order to reduce vulnerability to future earthquakes. While some village members would have preferred to use wood/teak to reconstruct their houses in the traditional Javanese *kampung* style, the requirement from donors was that they must use cement and iron in order to maintain earthquake resistance standards (CM-01). In Puton, there was also a push to reduce the impact of flooding hazards. Houses located close to the river were relocated to higher ground and the low-lying areas were then used as agricultural fields as well as the location of aquaculture and animal breeding stalls. Unfortunately, this approach has not led to a total elimination of damage from natural hazards. The 2010 Merapi volcanic eruption increased sediments in the river basins leading to more frequent flooding in Puton that has damaged aquaculture ponds (De Bélizal, 2011).

As mentioned above, *Ibu X*, a woman employed by the Central government in the Forestry Ministry, took control to manage the relief and reconstruction activities after the death of the village *dukuh*. Due to her English speaking skills, her education (Master's degree obtained in the Netherlands) and numerous external contacts with organizations in Indonesia and abroad, Puton village was able to attract a series of recovery and reconstruction projects aimed at facilitating an increase in living standards. Considering herself a 'community volunteer', *Ibu X* has focused on improving the range of livelihood opportunities available to villagers in Puton. Although *Ibu X* and her family are not native to Puton village, and at the time of the earthquake she had only just begun to reside in the village, her ability to manage and attract aid and programs to Puton village has earned her the respect of male and female villagers in Puton. During the household interviews, several villagers noted the respect and admiration they held for *Ibu X*, noting that after the earthquake, although she had her own family and was pregnant, she took responsibility for all the villagers and tried to help their families (HI 01-021). One of the neighbourhood leaders noted that if *Ibu X* had not been in the village after the earthquake, the relief and recovery would have been very different. He noted that there were difficulties in providing assistance to some villages due to their remote location. Trucks would be stopped along the roadside and other villages would claim the aid for their own. He stated that if *Ibu X* called for the aid, the aid would always make it to Puton and other villages would not be able to stop it (HI 01-019). Another example of the role of *Ibu X* in the recovery period is through her negotiations with international NGOs that provided assistance in the community. One particular organization, Cordaid, was willing to provide transitional shelters to the community, although it was almost one year after the earthquake before they were able to operationalize this donation. The community felt that the shelters were unnecessary as many households had either already received transitional shelters or were in the process of building their permanent homes (CM-01). Instead, *Ibu X* negotiated for a new project: the provision of septic tank facilities for all households (HI 01-024). Previous to the earthquake, many families used the nearby river to dispose of their waste; due to *Ibu X*, the donation from Cordaid was used to provide bathroom and sanitation facilities for all households in Puton (HI 01-005; 01-011; 01-016; 01-022).

In terms of the long-term development programs initiated by *Ibu X*, there has been an emphasis on livelihood opportunities. Many villagers were reliant on seasonal employment and dependent on weather conditions. Through the implementation of a series of economic development programs, *Ibu X* has attempted to diminish the dependence on seasonal income and increase the security of

income sources. Connections with both Gadjah Mada University and Hanseo University in Korea have led to the recent implementation of a 5-year development plan to transform Puton into an eco-village. As a pilot project, some villagers are using biomass and compost to produce gas and electricity for adjacent households. Projects have also been implemented to reduce the use of fertilizers, establish animal husbandry and aquaculture activities, planting of Durian trees for all households, as well as establishing local tourism initiatives, including home-stays, local restaurants (*warungs*) and paths and activities for tourists to explore the village (HI 01-002; 01-011; CM-01). The success of some of these initiatives has been noted in the poverty statistics for Puton village. Before the earthquake, over 50 families were categorized as very poor, by 2011, approximately 20 – 30 families were classified as very poor (CM-01). This 50 percent reduction in the number of ‘very poor’ families occurred over a two to three year time period and is indicative of the rapid transformations that have occurred in Puton village in the post-disaster period.

Although there are some positive transformations occurring in the village, there is one large problem that has limited the ability of the village government to implement their development programs. The relationship between Puton village and the *lurah* (*desa* leader) has been strained since the *lurah* was elected into power in 2005. Villagers indicated that during the election period, one of the *lurah*'s rivals was from Puton village and many of the villagers supported the rival. After the *lurah* was elected, he refused to provide any government funding to Puton village and all funding and programs have been diverted to other *dusuns* in the *desa*. Thus, any funding designated for village development that is channeled through the local *desa* office is diverted to other sources and Puton has received no funding through official government sources (HI 01-024; 01-007). *Ibu X* has been forced to search for other funding sources, particularly through university partnerships and humanitarian organizations.

Puton village was selected for inclusion in the research as the village provides an opportunity to explore the impacts of strong leadership and the transformations that were attempted after the earthquake and during the recovery period. There has been an emphasis on long-term development initiatives to raise the standard of living of the people as well as improve the resilience of the community in facing the various environmental hazards threatening the village.

5.3.2 *Kategan*¹³

Kategan *dusun* is located in Patalan *desa*, Jetis *kecamatan*, one of the hardest hit districts in Bantul during the earthquake. Similar to Puton, the village has a residential core area surrounded by agricultural fields (see Figure 5.5). The village is at high risk for earthquake and strong storms, as well as small flooding risk in some areas. The majority of villagers are engaged in farming labour activities, particularly the women, although other income activities include pedi-cab drivers, factory workers and construction labourers. Many households, particularly the older generations, are dependent on remittance payments from their children who are either working in Hong Kong, Singapore or Malaysia, as well as larger cities in Indonesia (HI 02-001; 02-003; 02-004; 02-017; 02-021). There are high levels of unemployment in the village, particularly for construction labourers and the younger population (HI 02-001; 02-012; 02-015). Overall, education levels are low with very few residents attending university or even high school (although high school education is more common in the younger generation). Without high school education or skills, many of the younger population are unemployed and are either leaving to go to larger cities in search of work, or are remaining in the village unemployed (HI 02-004; 02-004).

During the earthquake, 13 people were killed with 5 more individuals passing away due to their injuries in the following days. Almost 90% of the population of Kategan experienced some injury, with 60% suffering serious injuries. All the houses in the village were damaged or destroyed in the earthquake. Infrastructure was also damaged, including the irrigation systems which made it difficult to recommence farming activities. The village *dukuh* had passed away shortly before the earthquake, and so there was a lack of leadership within the village in terms of obtaining, organizing and distributing aid. For two years following the earthquake there was no village leader until the new *dukuh* was elected in 2008 (CM-02). In order to facilitate the distribution of the emergency aid, the youth organization in the village took control and distributed the relief throughout the village. The youth organization (comprised mainly of older children in the village aged 16 - 25) also facilitated the rebuilding of houses through purchasing the materials and providing the materials to each household in the village (HI 02-007). In Kategan village, the decision was made to register all households in the heaviest category of damage so that all families would receive the full RP 15 million funding (HI 02-001). The villagers were provided the

¹³ Information in this section is derived from household interviews #02-001 to 02-025, FG-02, CM-02

materials to rebuild their houses and villagers used gotong royong in order to save on labour expenses.

Figure 5.5: Photographs of Kategan Village



a) Typical unfinished house in Kategan



b) Shared bathroom facility in Kategan



c) Agricultural fields surround residential area



d) Traditional Joglo house belonging to the Lurah

In terms of long-term livelihood and development programming, Kategan has received limited assistance. While there was a program during the recovery period that focused on training villagers to process and sell coconut, there was no provision of capital to start businesses as well as a lack of training in establishing networks and markets for selling the products. Currently, there are no coconut producers in the village. There were also difficulties in implementing the government-run sewing program as there was conflict over whether the sewing machines should be distributed to individuals or to establish a communal sewing area where multiple people could use the sewing machines when necessary. At the time of the research, the sewing machines are not being used (CM-02). Other than these two programs, there has been very limited assistance provided to the village and very little attempt by the village leaders to attract funding or to implement new programs.

The *lurah*'s house was located in Kategan village. The *lurah*'s wife currently resides at the house in Kategan village although the *lurah* spends most of his time at his second home in Yogyakarta city where he is engaged with his businesses activities (CM-02). The *lurah*'s house in the village is a traditional *joglo* style house that has been in the family for generations (see Figure 5.5). The *lurah* is a man of noble ancestry, considered part of the aristocracy of the Sultanate in Yogyakarta. Because of this, he has received formal education and is considered a wise man who can solve difficult problems in the village. If there is a problem that the villagers cannot solve, or if they consider it a difficult problem, they will contact the *lurah* and he will provide assistance and solutions that are supported by the villagers (HI 02-005; 02-007). He is well respected among the villagers although due to his business activities and responsibility for 20 *dusuns* in the *desa*, he is not able to attend to the issues in Kategan regularly.

The current standards of living in Kategan village are the lowest of the five villages selected for inclusion in the research. Most of the houses remain unfinished following the earthquake, with many lacking flooring and finished walls (see Figure 5.5). Although water and sanitation facilities were built following the earthquake, these were not provided to all individual houses and many households share bathrooms and wells with other families, as well as those who continue to use the nearby river to dispose of their waste (HI 02-003; 02-013; 02-022). The biggest concern for many of the villagers is ensuring they have enough food and money to meet their needs on a daily basis. In fact, harvest failure and hunger was cited as a primary hazard for many villagers (HI 02-002).

Kategan village was selected for inclusion in the research due to preliminary impressions that the village exhibited a lack of resilience and adaptive capacity in the aftermath of the earthquake disaster. Although the *lurah* is a strong leader, he is responsible for multiple villages and there is a lack of strong leadership at the village level, as well as overall low levels of education, knowledge on development and social programming, and low income levels. Overall, the village gave the impression of passivity; while villagers would like to see positive changes, most villagers indicated they didn't know how to accomplish this and were waiting on external organizations to come in and help them.

5.3.3 *Wonokromo I*¹⁴

Wonokromo I (hereafter referred to simply as Wonokromo) village is located in Wonokromo *desa*, in Pleret *kecamatan*. Located at the confluence of two large rivers (the Opak and Gadjah Wong Rivers) as well as a third tributary river (the Belik River) running through the village, the area has a risk of flooding as well as risks from earthquakes, strong wind storms and fire due to the density of housing. Currently, there are 325 households in the village, with a total population of 900 people although at the time of the 2006 earthquake there were 300 households and 875 people. The majority of villagers have achieved high levels of education, with approximately 80% of the villagers engaged in formal employment, mainly working as government officers or teachers (CM-04). The village can be described as semi-urban, with higher population densities than the other selected villages, as well as exhibiting unique features, such as a Judo training centre. The majority of the village land is developed so there are a limited number of farmers, although some villagers still work as farm labourers. Remaining villagers are engaged in entrepreneurial activities such as tailors, shop owners and food/product producers (HI 04-004). Located to the immediate south of Yogyakarta city, Wonokromo village sits immediately adjacent to a main road, resulting in easy access to the city and transportation infrastructure. The village also sits immediately beside Wonokromo II; the villages used to be one large village, although the large size meant the village was split administratively into two smaller villages in 1974 (CM-04).

Wonokromo village has important historical connections to the sultanate and religious institutions. The village was built on independent land given to Abdullah Fakhri by one of the first Sultans of Yogyakarta province. Abdullah Fakhri built the village of Wonokromo on the land: as a gift from the Sultan, the land was considered independent and therefore, the residents were not required to pay any taxes until the Republic of Indonesia was created in 1945. As part of this religious heritage, there is a large mosque that was built in the village, and a Sultanate representative has been appointed as caretaker of the mosque (HI 04-001). Along with the mosque, there are numerous religious boarding schools in the village that are a reflection of the strong religious heritage and strength of religious institutions in Wonokromo. Students from all over Indonesia have attended these religious schools, which positively impacted the recovery experience following the earthquake (HI 04-008). Figure 5.6 depicts Wonokromo and some of the features found in the village.

¹⁴ Information in this section is derived from household interviews #04-001 to 04-025, FG-04, CM-04

Figure 5.6: Photographs of Wonokromo Village



a) Main road and housing in Wonokromo



b) Large mosque shared between Wonokromo I & II



c) Typical housing style in Wonokromo



d) Judo club in Wonokromo

Wonokromo is located along the Opak river fault; during the earthquake, large cracks appeared in the ground in the village. Seven people were killed in Wonokromo I, along with 15 others in Wonokromo II. Four people from outside the village, who happened to be in Wonokromo at the time of the earthquake, were also killed; these four persons would not be included in the official statistics for the village (CM-04). Immediately following the earthquake, many of the villagers made their way to the mosque to pray, although others started to head north due to a false tsunami warning (HI 04-008; 04-006). In the evening, the leaders from the village held a meeting to discuss how they could provide immediate shelter and food to the affected villagers. Wonokromo I and Wonokromo II established one office to organize and coordinate the emergency aid, although this was disbanded after three days. Coordination and communication between the two villages remained strong throughout the relief and recovery period (CM-04).

Due to the close proximity to Yogyakarta city, as well as the strong external connections maintained by many villagers, there was a large amount of in-kind and monetary donations: in the

first day following the earthquake, the village received RP 4 million (approximately \$425 USD) to help facilitate emergency aid. Villagers also have connections to Central government and military officers, and on the second day following the earthquake, approximately 60 soldiers from the marine army were deployed to the village to provide emergency assistance. The military provided two military tents and kitchen tools (CM-04; HI 04-001; 04-008; 04-011). The villagers themselves began the process of cleaning debris and reconstructing their houses almost immediately following the earthquake (HI 04-003; 04-004). The mosque in the village had a generator, so villagers were able to use the mosque area for temporary shelter and communal cooking. The electricity also allowed the village to maintain radio communications outside the area, which also helped facilitate requests for immediate assistance (CM-04).

In terms of the shelter relief and recovery programs, very few families in Wonokromo accepted transitional bamboo housing as they were afraid that acceptance would limit the amount of funds they would receive for their permanent houses (HI 04-005). Many families were able to begin the process of rebuilding almost immediately as they had the stable income levels and savings in order to rebuild on their own. As the majority of residents were engaged in formal employment, they also did not suffer reduced income levels that were common in other villages (HI 04-010). In terms of permanent housing reconstruction, as the majority of villagers worked in formal employment, there was a lack of skilled construction labourers in the village. This limited the ability to use *gotong royong* to rebuild each other's houses, and therefore, most families in Wonokromo had to pay for outside labourers to reconstruct their houses. There was an abundance of labourers who came to the region to assist in the recovery effort, although not all of these labourers were skilled in construction. There were instances of shoddy construction and in some cases, the rebuilt houses had to be torn down and reconstructed in order to meet the earthquake resistant guidelines established by the government and JRF funding sources (HI 04-005; 04-011). Regardless of these issues, the villagers were still able to completely rebuild all houses and buildings within two years following the earthquake.

During meetings with village leaders, several reasons were highlighted as to why Wonokromo village was able to recover at a quicker pace than other villages¹⁵. The geographical location of the city provided easy access for donations and direct access to immediate relief and emergency aid. There is also a high degree of external social networks in the village, not just among village

¹⁵ Information in this section is derived from CM-04, FG-04; HI 04-005; 04-011; 04-013)

leaders, but in many households. As many of the villagers have achieved high levels of education (university degrees), villagers have connections through their employment as well as personal family and friends. Many villagers who have left the village and were working in Jakarta and other large cities still felt strong connections to their families and the village itself. The village has strong *silaturahmi* – an Arabic term for keeping connections between each other. The village connection with the Sultanate has led to strong feelings regarding the noble history of the area, and villagers maintain that connection even when they leave. There are formalized organizations outside the village where former villagers living in other cities get together for social activities. Another aspect that has helped build the strong external connections is the number of religious boarding schools in the village. Students from across Indonesia have spent time in Wonokromo village and many still maintain strong connections: this led to a high level of donations from people all across Indonesia who sent money and aid to help support the recovery effort of the villagers. The strength of the religious faith of villagers was another highlighted aspect that impacted recovery rates. Villagers have high levels of respect and faith in religious leaders, and the leaders were able to provide inspiration and spirit for people to begin their recovery. Believing the earthquake was their destiny from God, they used their religious faith to help rise up from the devastation. Other factors highlighted by village leaders include the characterization of the people as hard working, diligent and innovative, as well as the strength of religious activities and institutions in the village.

While the above paragraphs have highlighted the positives aspects of Wonokromo, there are also issues, particularly in regards to social relations in the village. As the village can be described as semi-urban, there has been a shift towards individualistic behavior and increased social conflict (HI 04-009). One of the research assistants noted that problems in Wonokromo are social in nature, as opposed to economic, and that almost all household interviewees commented on the social conflict in the village. Some villagers do not participate in *gotong royong* activities, with wealthier individuals paying out of participation. There is increased competition between families in terms of standards of living, style of housing, what private schools their children attend, levels of education etc. There is also conflict between the different types of leaders in the village (HI 04-003; 04-006). The strong religious institutions have led to a number of religious leaders in the community who are well-respected by the villagers. At times there are conflicts between the religious and government leaders. There are also conflicts between various government leaders in the village. At the time of the earthquake, the *dukuh* had held his position for three years. There were three other rivals in the community running against the *dukuh* for election; there are still individuals in the

community who follow the rivals. This has led to somewhat fractured relationships within the village, with different households supporting different community leaders and their agendas (CM-04; HI 04-006; 04-009). Consequently, there have been difficulties implementing some government programs as well as a lack of trust between different households.

Wonokromo village was selected for the research due to the number of religious and historical institutions that have contributed to strong social capital. As well, due to the semi-urban nature of the village, the higher levels of income and education, and strong external networks, Wonokromo represented a unique village that exhibited resiliencies not found in the other villages. On the other hand, the village provided an opportunity to explore some of the downsides of these resiliencies, particularly through the weaker social connections within the village and the conflict between various leaders in the community.

5.3.4 *Ngandong*¹⁶

Ngandong *desa* is located in Gantiworno *kecamatan* in Klaten regency in Central Java province. The village is comprised of eight *dusuns* and 28 *RTs*. The village is located in the southern part of Klaten, and is fairly isolated from the main roads and economic activities in the larger urban areas. The village is at risk for earthquakes, as well as small storms, landslides in some areas and ongoing issues of flooded agricultural lands (HI 03-001; 03-003; 03-005). The majority of villagers are working as construction or farming labourers, although there are a few villagers that have been successful with entrepreneurial activities. The majority of construction labourers are employed in Yogyakarta city. There has been an emphasis placed on the role of education in the village, and many villagers have saved to send their children to university. Similar to Kategan and Puton, Ngandong village is arranged in a series of residential areas (although not necessarily individual *dusuns*) surrounded by agricultural fields.

The earthquake disaster resulted in the complete collapse of all but five houses in Ngandong. The five houses that remained standing had substantial damages to the cement portions and only the sections of the house constructed from bamboo remained standing. During the earthquake, 17 people were killed, and a further 10 died in the days following the disaster. Ngandong village received ample emergency assistance immediately following the earthquake, particularly from strangers, family members from unaffected villages as well as private companies that provided

¹⁶ Information in this section is derived from household interviews #03-001 to 03-025, FG-03, CM-03

donations (HI 03-001). One of the most important organizations that provided assistance was the government of Wonogiri *kabupaten*; Ngandong village is located in close proximity to Wonogiri and because the government of Klaten was busy with all the affected villages, the government of Wonogiri provided food and temporary shelter assistance to Ngandong and other villages along its border. Furthermore, transitional housing was provided to many villagers in Ngandong by the Red Cross. In the initial stages of the relief effort, there was an offer of government assistance (*Proyek Penanggulangan Kemiskinan di Perkotaan* (P2KP) - Urban Poverty Alleviation Program) which was willing to provide funding to build 20 houses before the official government funding was implemented. The government of Ngandong decided to turn down these 20 houses as they felt it would be difficult to choose which families would have their houses built first and would create social conflict within the village. Hence, the program was delayed until after the official government housing program was finished: at that point the P2KP was administered and helped provide housing to those families that did not receive the official government funding (HI 03-001; CM-03).

During the reconstruction effort in Ngandong, the government established groups of approximately 15 households in order to manage the distribution of materials and rebuilding effort. Through these groups of 15 households, the houses were built step-by-step using the government funding (CM-03). Funding was provided by both the Central government and JRF (who provided 18 units in Ngandong). Every household received aid from one source although there was no funding for people who did not have houses before the earthquake. The houses in Ngandong are more varied in shape in style and some have retained, to a certain degree, the traditional Javanese housing style that was common in villages before the earthquake (see Figure 5.7).

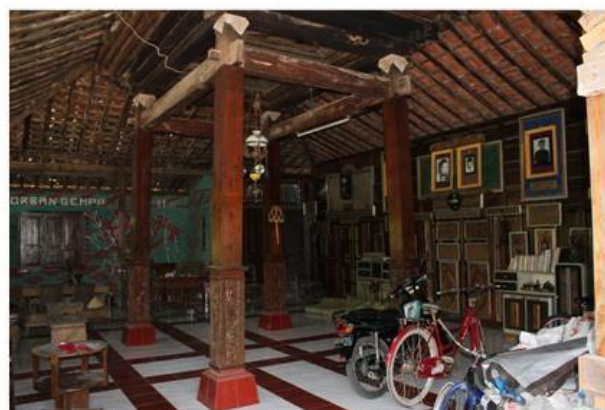
In terms of livelihood recovery, there has been funding in Ngandong to develop the economy. In 2008, USAID provided 150.000.000 IDR (approximately \$16,000 USD) for economic development; this was in addition to a private donation of 4.000.000 (approximately \$425 USD) and 30.000.000 (approximately \$3,200 USD) provided by the Klaten government. With a budget of 184,000,000 IDR (approximately \$19,600 USD) for village development and livelihood recovery activities, the government established a village bank for the villagers to have access to low-interest credit (the village bank interest level is 1.8% compared to 2.5% - 3% bank rates) for establishing entrepreneurial activities. Currently the bank has been successful in maintaining a consistent cash flow as the villagers have been diligent about repaying the loans on-time: the

current default rate is 5% (CM-03). Although the purpose of the village bank is to provide assistance with establishing business activities, many of the villagers are taking loans in order to pay for daily living expenses as opposed to starting new businesses (HI 03-001; 03-007; 03-025). There is also a limited cash flow of the bank so there is difficulty in providing larger loans due to the risk involved. The above-mentioned funds also provided assistance for other programs, including the programs run by the PKK (women's organization in the village), including *posyandu* and the provision of loans specifically for women, as well as an animal breeding program that provided goats and chickens to the poorest villagers. A cow stall was also built by a humanitarian organization in 2009, although currently the stalls are empty as there was no provision of capital to supply the cows (CM-03).

Figure 5.7: Housing Styles in Ngandong



a) Variety of housing styles in Ngandong



a) Traditional Javenese house in Ngandong

In the aftermath of the earthquake disaster, there were problems with a lack of data as well as incorrect data. The *desa* office did not have the correct information regarding the number of houses and public facilities and it was difficult for the seven staff members to collect the data in the immediate aftermath of the earthquake as they were also trying to respond to the needs of their own families, many of whom had injuries. Thus, the funding levels they received were incomplete and did not allow the government to fully implement recovery programs in the village: the village *lurah* argued that the response was hindered by a lack of data (CM-03; HI 03-001; 03-006).

Ngandong village was recommended for the research by the government officer in Klaten due to its strong leader, the *lurah*. The *lurah* has been a vocal opponent of corruption at various levels, fighting to ensure that his village receives the funding it has been allocated by the Central government. The *lurah* told a story of how he would look through all the budget materials at

budget meetings at the *kabupaten* and *kecamatan* level so that he would know exactly how much money his village was supposed to receive. Typically, 20% of the funding allocated by the Central government would be levied as an informal administration fee by the government in Klaten. The *lurah* would consistently complain at budget meetings and to various government officers in order to find out what was happening to the 20% cut: currently his village is receiving almost 100% of the funds that have been allocated by the Central government (CM-03).

While Ngandong village has strong leadership and lower unemployment levels than villages in Bantul, there are ongoing environmental issues with their agricultural lands. In 1975, in order to facilitate the agricultural development of marshland located to the west of the village, the district government built a drainage channel. However, since this drainage channel was built, there have been flooding issues on Ngandong agricultural lands that have limited the productivity of the land. Drainage problems have intensified since 1975, with many farmers losing their crops throughout this period (HI 03-001). Thus, in 2010, JRF provided funds to build new channels in Ngandong in order to drain the flooded agricultural lands. Unfortunately, the newly built drainage channels did not work properly: instead of draining the fields, the channels continued to drain water into the fields, resulting in further flooding (see Figure 5.8) (HI 03-003). This is the most important issue currently facing Ngandong village as multiple villagers have lost entire crops, some for as long as seven years (HI 03-008; 03-009; 03-012; 03-013; 03-014; 03-015; 03-019; 03-022; 03-025).

Figure 5.8: Permanent flooding of agricultural fields in Ngandong



a) Poor drainage in agricultural fields in Ngandong



b) Flooded agricultural fields in Ngandong

Ngandong was selected for inclusion in this research due to the strong leadership displayed by the village government, although leadership styles were different compared to Puton village. The village has exhibited resilience throughout the recovery process through strong community

cooperation and implementation of livelihood programming. As well, although the majority of villagers are working in low-income labourer positions, there has been a strong emphasis on education in the village that has resulted in numerous low-income families sending their children to university. Unfortunately the ongoing environmental issues and problems implementing some of the longer-term development programs have hindered the ability of the village to dramatically change the living conditions of the village. Hence, Ngandong village offers an opportunity to explore the impacts of the adaptive capacity features of the village in conjunction with ongoing vulnerability and livelihood issues.

5.3.5 *Sengon*¹⁷

Sengon *desa* is located in Prambanan *kecamatan* in Klaten regency. Located in the southern part of Prambanan, the village is close to the hills separating Klaten from Wonogiri. The village is located quite a distance from the main roads in Klaten, leading to isolation and lack of connections with market facilities and business opportunities (HI 05-012). Although Sengon village has multiple *dusuns*, data were collected in the two *dusuns* that experienced high levels of damage in the earthquake: Sumberejo and Cabakan. From this point forward, when discussing Sengon village, this is referencing Sumberejo and Cabakan only (unless otherwise stated). Within these two *dusuns*, there are 220 households and approximately 900 - 950 people. The majority of the population are employed as construction and farming labourers, although the economic conditions in Cabakan are slightly better than in Sumberejo (CM-05). There is a small minority of government workers, and the housing style and standards of living between government workers and labourers is quite distinct and visible (HI 05-004). Education levels are higher in some areas of the village: there appeared to be a spatial component to educational levels as certain neighbourhoods emphasized education whereas others did not (HI 05-007; 05-025). The village has a high risk for earthquakes, and landslides in some areas. There is also risk from heavy storms, as evidenced by the destruction of the village office in November 2010 due to a small-scale wind storm (referred to as local tornadoes - *angin puting beliung* - in the Indonesian context) (HI 05-013). Interestingly, the village office was not damaged in the earthquake.

Within Sengon village, Cabakan suffered the highest level of damages due to the density of building structures. People were able to escape their houses, but because of the density of buildings, there was little open space to escape the falling debris - many people in Cabakan died

¹⁷ Information in this section is derived from households interviews 05-001 to 05-028, CM-05, FG-05.

from falling debris as opposed to inside their houses (HI 05-001; 05-007; 05-019). In the immediate aftermath of the earthquake, Sengon received support and donations from multiple sources, including the government and private donations. A private Indonesian bank provided the village with 30,000,000 IDR in order to facilitate emergency tents and the daily living needs of villagers. The youth community worked together with the government leaders in order to provide emergency shelter for coordination posts as well as for the community. There was difficulty distributing aid throughout the village as many of the roads were blocked with debris. While volunteers attempted to remove some of the debris by hand, it was not until two months later that the debris was cleared. Heavy equipment was brought in by the Central government in order to clear the roads in conjunction with an announced visit from the President. During this visit, President SBY announced that they would be building an earthquake memorial in the area, as depicted in Figure 5.9 (HI 05-001).

Figure 5.9: Earthquake Memorial in Sengon village, erected on the one year anniversary of the earthquake



During the housing reconstruction, the villagers of Sengon strictly followed the government deadlines for each step of the funding process. The government provided funding on a step-by-step basis and declared a series of deadlines for which construction for each step should be completed. While some of the other villages ignored these deadlines, the residents of Sengon followed them although there were difficulties finding the necessary labourers (HI 05-026). Many households hired labourers from outside the village to help rebuild each step of their house in order to meet the government-set deadlines (HI 05-002; 05-006; 05-012; 05-024). Although *gotong royong* was used in some cases, the strict adherence to the government deadlines limited the ability of many households to rebuild using *gotong royong*. Housing funds was provided from three sources: the

government, the JRF (funding for 59 houses) and World Vision (funding for 40 houses) (HI 05-028). There was some discrepancy in terms of how the different funding sources worked, as World Vision provided the labour for the house construction, and it was understood that JRF had strict rules regarding the re-use of building materials and the layout design of the house (HI 05-028).

In regards to livelihood assistance, there were a limited number of programs in Sengon. A small amount of funding was provided to initiate a village bank, although the level of funds in the program remains low (CM-05). Although many villagers have access to this micro-credit program, the majority have not been able to take advantage of assistance for business development, instead taking loans for housing reconstruction and everyday living needs (HI 05-001; 05-008; 05-011). Some animal breeding programs were also implemented, particularly the provision of goats for the poorest households. The PNPM program through the social ministry also implemented a sewing training program in the village, although there was some social conflict in terms of how participants were selected for inclusion (HI 05-003; 05-020; 05-025).

The villagers noted three key aspects that have improved since the earthquake. First, housing has been rebuilt with iron reinforcements according to earthquake resistant standards. Second, social conditions and *gotong royong* spirit have improved since the earthquake. Villagers have regular meetings to maintain their feelings of togetherness and continue to use *gotong royong* to build and maintain public facilities such as the small bridges and drainage channels. Third, after the irrigation channels were damaged they were rebuilt with a new design, improving the overall water circulation in the agricultural fields (HI 05-003; 05-006; 05-010; 05-015; 05-021; 05-024). Unfortunately the villagers have been unable to experience the benefits of these improved irrigation channels due to unpredictable weather and bug infestations. While the bugs, called *wereng hijau* (green leafhopper), are typical for the area, they thrive in wet conditions and normally die-off during the dry season. Due to unpredictable weather conditions and the lack of dry weather, the bugs have continued to propagate and have infested the agricultural lands throughout Sengon and surrounding areas (HI 05-007; 05-010; 05-014). Although the villagers have attempted to use pesticides, this has not led to any significant decreases in the infestation.

Sengon village was chosen for inclusion in the research due to the ongoing problems facing households in terms of their livelihood activities. There was a significant lack of social programming following the earthquake, particularly in comparison to the other villages. This resulted in limited support and adaptive transformations in terms of the social conditions for the

people in Sengon. Sengon is also struggling from the ongoing bug infestation conditions that have severely reduced crop yields, resulting in ongoing crisis conditions for the poorest families. Thus, Sengon provides an opportunity to compare the experience of those villages that were able to implement positive changes versus those that were not as successful.

5.4 Summary and Conclusion

The above chapter provided a brief discussion of Yogyakarta and Central Java provinces in order to provide sufficient context for the issues and concepts discussed in the following chapters. This included an overview of the concepts of *desakota* and *gotong royong* and how these impact approaches to hazards and disasters. The primary purpose of the chapter was to focus on outlining the selection of village sites, detailing the requirements for including villages in the case study. This was followed by an overview of each of the villages, including the characteristics, the overall recovery experience as well as ongoing issues and concerns facing the villagers. The purpose of these village overviews was two-fold: the first was to provide sufficient background information on the context of each village in order to support the interpretations and discussions included in the following chapters; and the second was to share the information about each village provided by village leaders and the respondents.

6.0 RESULTS

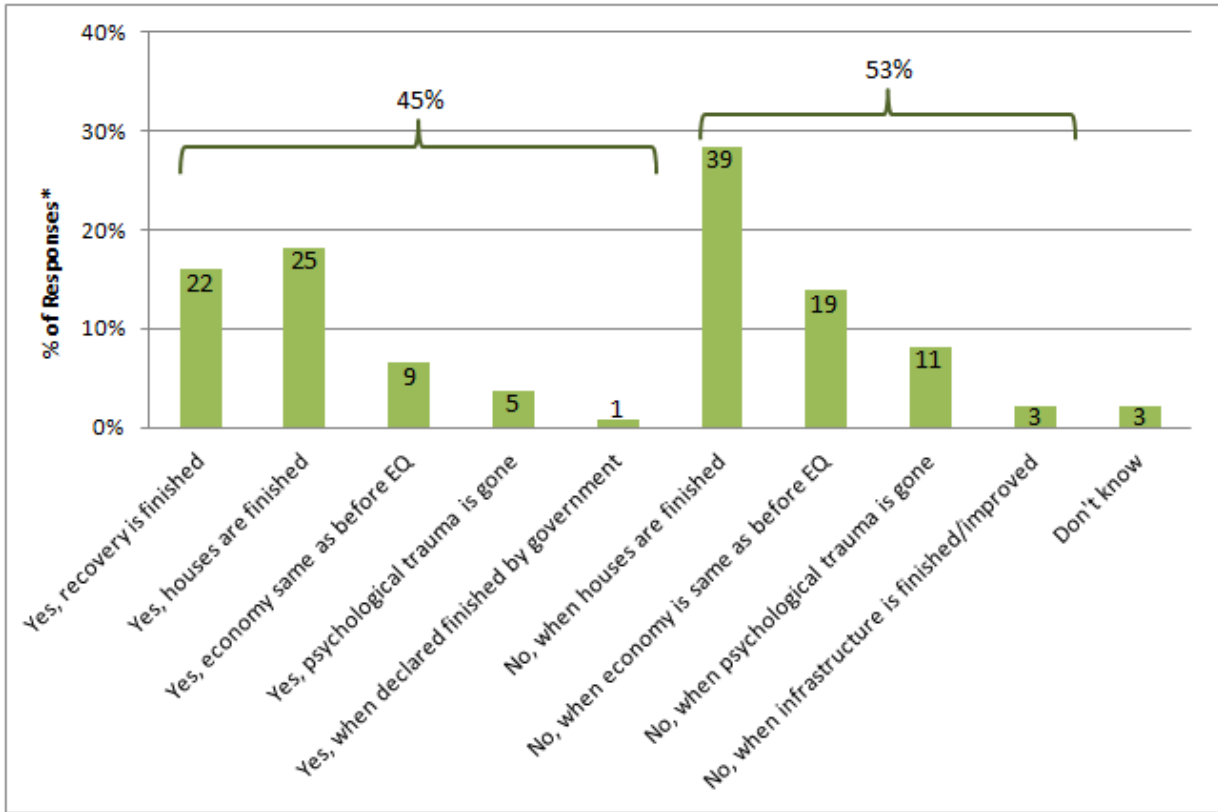
In order to achieve the objectives set forth in the introductory chapter, the Resilient Disaster Recovery Assessment Framework (RDR-AF), described in chapter three, was developed as the conceptual tool to inform a holistic evaluation of one long-term disaster recovery effort. Using the case study approach, the assessment of the 2006 Yogyakarta earthquake recovery programming is used to provide empirical evidence to test and support the use of this framework, as well as providing further information on the process of long-term disaster recovery. Furthermore, in chapter seven the empirical evidence is used to further refine the conceptualization of resilient disaster recovery. The following summary of results will be used to support the overall assessment of the 2006 Yogyakarta recovery effort summarized in the discussion chapter.

Before moving on to an analysis of vulnerability, resilience and livelihood conditions, it is interesting to note whether villagers believe they have recovered from the disaster or not. While government and NGO recovery programming has been completed, in some cases for up to three years, villager responses indicated over half of interviewed households believed they had yet to recover from the disaster. Several reasons were highlighted as evidence to support their opinions, as depicted in Figure 6.1. Rationales for defining whether recovery had finished or not particularly focused on the housing reconstruction effort, with many villagers noting that their houses remain incomplete¹⁸. Economic conditions and psychological trauma were also cited as evidence to support opinions that the recovery effort was either finished or not finished (HI 01-022; 02-006; 02-017; 03-014; 03-015; 03-016; 03-017; 03-018; 03-021; 04-004; 04-006; 04-008; 04-009; 04-017; 05-021; 05-025). In most cases, interviewees provided their responses focusing almost exclusively on their own recovery. Thus, if they believed that they had recovered from the earthquake, they would indicate that the entire recovery effort was complete. In some cases, villagers highlighted that they believed their own recovery was finished although they pointed to other villagers around them who had not sufficiently recovered yet (HI 01-016; 02-025; 03-006).

While the evidence suggests an incomplete recovery effort, a more in-depth assessment is provided through the RDR-AF approach. This overall understanding of villager perceptions of recovery will be used to frame the results section, highlighting the overall opinion that although the majority of recovery projects had long ceased, the majority of villagers do not believe they have recovered.

¹⁸ 54% of respondents indicated that their house was not yet complete

Figure 6.1: Point of Recovery after 2006 Yogyakarta Earthquake



*n = 93, total responses = 137

In order to organize the results under the RDR-AF, the various vulnerabilities and resiliencies for the five villages under each of the seven sustainable livelihood capitals are summarized below. The vulnerabilities and resiliencies of each of these capitals are explored in relation to the earthquake and subsequent recovery experience, as well as current conditions within each village. This approach is used to assess whether increased and/or decreased levels of vulnerability and resilience trends are specifically a result of the earthquake and subsequent recovery effort. This will provide the basis for exploring whether the recovery effort successfully contributed to vulnerability reduction, resilience building and sustainable livelihood initiatives, as outlined in the resilient disaster recovery assessment framework.

6.1 Human Capital

As noted in section 2.2.3.1, human capital represents the “skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives” (DFID, 1999, p. 7). Within the context of vulnerability and resilience for

facing disaster events, this also includes hazards knowledge and preparedness activities. Table 6.1 provides an overview of the various human capital vulnerabilities and resiliencies of each village, followed by a discussion focusing on three human capital themes: education and skills; health, and; hazards preparedness/knowledge. Note in the human capital summary table, as well as the summary tables for the remaining six capitals, some elements are listed simultaneously as both vulnerabilities and resiliencies. This seeming contradiction is a result of the nature of disaster recovery as well as a reflection of the relationship and interactions between vulnerability and resilience. Further discussion on the relationship between these two concepts is included in chapter seven.

Table 6.1: Summary of Human Capitals

Village	Vulnerabilities	Resiliencies
Puton	Lack of education; Large supply of unskilled labourers; Psychological trauma from earthquake remains; Lack of hazards knowledge and awareness; Some poor have a lack of desire to improve + learn + change	Increased awareness of environmental sustainability and importance of education; Large supply of labourers; Government provides support for health and education services for poorest; Creation of disaster risk reduction organizations
Kategan	Lack of hazards knowledge and awareness; Very low levels of education; Psychological trauma from earthquake remains for some; Passive mental state - low levels of desire for change; Many youth are leaving village to look for work, leaving the older members	Increased awareness of hazards, with many villagers taking hazards courses and participating in simulations; Access to some government programs for education and health services; Large supply of labourers; Some training programs, particularly for youth
Wonokromo	High levels of psychological trauma from earthquake remain; Lack of construction labourers meant people meant hiring for housing reconstruction	Good hazards knowledge; Hazard mitigation measures and preparedness organizations; High levels of education and strong emphasis on education throughout village; Increased skill and knowledge of construction standards after earthquake
Ngandong	High cost prevents some from attending higher education; Many do not feel prepared to deal with another disaster and still have psychological trauma; Large supply of unskilled labourers	Strong emphasis on education throughout village; Higher levels of hazards awareness and preparedness initiatives compared to other villages; Established disaster management plans and preparedness organizations; Access to some government programs for education and health services; Large supply of labourers
Sengon	Lack of hazards knowledge among some villagers; Psychological trauma from earthquake	Strong emphasis on education throughout village - younger generation generally achieves high school education;

	remains; Many construction labourers are unskilled, leading to lower wages and unstable income; Lack of knowledge about marketing products and businesses	Good hazards knowledge and experience
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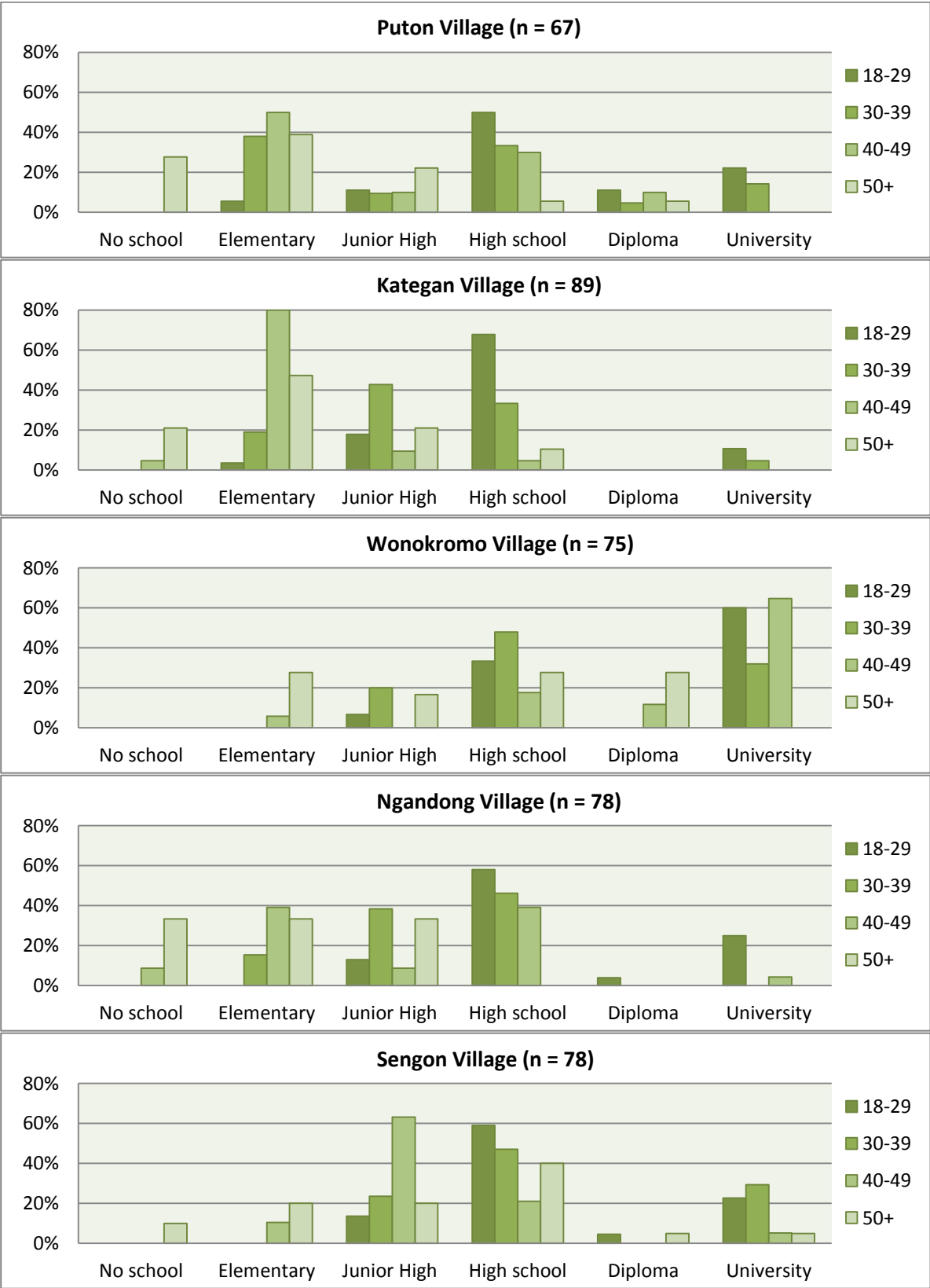
6.1.1 Education, skills and knowledge

There were significant differences in terms of household member levels of education among each of the five villages, as demonstrated by Figure 6.2. From the education analysis, Kategan had the lowest mean levels of education, followed by Ngandong, Puton, Sengon, and Wonokromo, although the two Klaten villages each had a substantial percentage (23% - 33%) of university educated individuals among the 18-29 and 30-39 age cohorts. The differences in educational levels among the five villages were found to be statistically significant at the 0.001 significance level, with the educational attainments levels in Wonokromo being significantly different in comparison to the other four villages¹⁹. Figure 6.2 also indicates an increase in education levels over the past half-century: compared to the number of villagers in the 50+ age cohort who did not attend formal schooling, the percentage of individuals not attending school has decreased to zero among all villages in the 30-39 and 18-29 age cohorts. The regression analysis indicated a statistically significant relationship at the 0.001 level, with an r-value of 0.461, highlighting a strong relationship between age and education levels. Furthermore, the results indicate that a majority of 18-29 year olds are achieving high school education.

Based on villager comments, these shifts in educational achievement levels can be attributed to two major factors: income levels and familial emphasis on education. Although public education up to the high school level is technically free in Indonesia, in reality, there are a variety of registration, uniform and supply fees that lead to substantial education costs for the poorest families. These educational barriers contribute to increased vulnerabilities related to lack of education: poor families noted the strain that educational costs put on the household, including stressing finances, requiring credit to pay tuition costs, and depleting savings (HI 01-011; 02-002; 02-011; 02-0014). In the context of university education costs, many families sold assets, such as land and cattle, in order to afford the tuition fees. This was regarded as a positive investment due to the likelihood

¹⁹ Statistical significance between educational levels in each village were calculated using ANOVA analysis, as well as a paired T-test (pair-wise mean comparison test) to test the significance of the differences between each village.

Figure 6.2: Educational Levels by Village



that university education would afford a significantly higher standard of living for their children. University education could also provide support for other family members, including contributing to household living expenses of the parents, and education costs for younger siblings (HI 01-008; 02-004; 03-004; 03-006; 05-002; 05-026). This contributes to resilience both within households and among family networks, providing a social safety net among family units. Unfortunately, for the poorest families, the level of assets required to pay university tuition fees is almost unattainable, further contributing to their overall vulnerability (HI 02-016; 02-019; 02-020; 03-001).

Perceptions of formal education differed across villages, particularly in relation to achieving a post-secondary diploma or bachelor's degree. In communities and neighbourhoods where education was viewed as very important (particularly in Wonokromo, Ngandong and sections of Sengon), parents were supporting their children, both male and female, to attend higher education institutions regardless of economic conditions (i.e. labourers were saving and finding funding sources to send their children to university) (HI 04-003; 04-009; 04-025; 05-002; 05-013). Families encouraged children to work hard and attempt to win scholarships, and accumulated savings in land and cattle that could be sold to pay tuition expenses (HI 05-011).

The varying degrees of emphasis on achieving higher levels of education can be attributed, in part, to spatial relationships: those who obtain university education and achieve higher standards of living influence surrounding households. Surrounding households see the higher standards of living that can be obtained through university education and want to achieve the same for their own children and families (HI 05-026). On the other hand, the poorest communities and households (particularly in Kategan and sections of Puton), held less positive views towards education (HI 01-007). In these instances, while households expressed a desire to see their children attend high school or university, they were not planning for that experience, they preferred their children to work to provide money for the household, or they held *laissez-faire* attitudes towards education and allowed their young children to decide what they wanted to do (HI 01-005; 01-007; 01-016; 02-021; 02-002; 02-022; 03-013; 05-001). Thus, education-related vulnerabilities were not always acknowledged in villages demonstrating the lowest levels of education.

Formal education at the university or diploma level was thought by many villagers to lead to a reliable and stable occupation, which could be seen as increasing resilience levels. For villagers who achieved elementary to high school education, the difference in livelihood success appeared to

have a higher correlation with skill development and the strength of social networks as opposed to levels of education (HI 05-005). Certain villagers had achieved secure and stable livelihoods with only elementary or junior high school education while others with high school lacked reliable employment and business opportunities. Those with the skills to develop an idea, the knowledge to maintain and enhance the business and the networks to market their product generally achieved success in their livelihoods initiatives (HI 01-005; 01-010; 03-010; 05-012). In the case of construction labourers, those with the highest skill generally have higher pay, more stable income and little to no unemployment periods (HI 05-026). On the other hand, those with lower skills, including construction assistants and farming labourers, faced high competition for employment, low payment and unreliable contractual positions (HI 01-021; 03-010; 05-010). In this sense, the issue for those who have not gone on to post-secondary education is not necessarily about attaining higher education levels, but having a skill that contributes to steady and stable employment that is not seasonally dependent (HI 02-021).

The relationship between education and skills/networks highlights the complexity of education as a vulnerability and resilience indicator. A certain degree of formal education contributed to reduced vulnerability due to reading and writing abilities, although the relationship between education and vulnerability was not necessarily consistent. While university education contributed to increased resilience in terms of stable income and the possibility of increased networks, the role of other levels of education in decreasing vulnerability was less clear. As a majority of 18 – 29 year olds have completed high school education, the role of skills and networks appeared to play a larger role in vulnerability reduction compared to educational attainment alone.

6.1.2 Healthcare services

Similar to education, the cost of healthcare and health programs in Indonesia can create substantial vulnerabilities, particularly for the poorest members of society. Fortunately, there are a number of government subsidized healthcare programs, at both community and national levels, based on a four-tiered system (VIP, 1st class, 2nd class, and 3rd class), that contribute to increased levels of resilience. The primary method for subsidizing healthcare for the poor is through the central government's 3rd class health insurance program called JAMKESMAS (*Jaminan Kesehatan Masyarakat* - Community Health Insurance). Of the 125 household interviews conducted, 40 households (32%) qualified for health insurance through the JAMKESMAS program. Qualification levels are based on a variety of factors, including income, housing, assets, and each village is

provided a strict quota for the number of poor families that can be registered for this program (CM-03, CM-05). There are also a number of other 1st, 2nd and 3rd class health insurance programs, including JAMKESOS (*Jaminan Kesehatan Sosial* - Social Health Insurance), JAMKESDA (*Jaminan Kesehatan Daerah* - Regional Health Insurance - regional program to target poor who are not covered by JAMKESMAS), JAMSOSTEK (*Jaminan Sosial Teneya Kerja* - Social Security Health Insurance - state-owned, private employer health insurance), and ASKES (*Asuransi Kesehatan* - Health Insurance - provides health insurance for public sector employees). These health insurance programs provided coverage for a further 22 households, indicating that almost 50% of the households surveyed had some form of government provided health insurance program. For these households, approximately 85% of community healthcare service and generic drug costs are covered by the government (HI 02-005; 03-005). While there were a small number of complaints regarding the quality and speed of service (HI 01-003; 04-007), the impact of these health insurance programs for the poorest is noted by villagers who stated that “if I didn’t have JAMKESMAS it’s difficult to pay medical care” (HI 02-020); and “healthcare is expensive, especially for the poor people. It’s impossible for them to pay hospital bill” (HI 02-023). Thus, these health insurance programs contribute to increased resiliencies in relation to health aspects of human capital.

For the remaining 50% of households who did not qualify for government-sponsored health insurance, healthcare costs were absorbed by the household. While the wealthier households can afford these costs (HI 01-010; 04-015), the cost is prohibitive for poorer households, and contributes to increased vulnerability. In the case of more severe health issues that require hospitalization or surgery, households have had to take credit (HI 01-004; 02-021; 05-008), borrow money from family or friends (HI 03-024; 04-001; 05-011; 05-017), or take money from savings (HI 01-005). In one instance, a villager had to use funding earmarked for housing reconstruction to pay for surgery to have his appendix removed. Due to this, he was unable to rebuild his permanent house and continues to live in the transitional shelter provided after the earthquake (HI 05-005). The impact of not having government health insurance is summarized by one villager who noted:

If you didn’t have money to pay, some people will just stay home with no care, or they will try to find the money somewhere – loans, go to family, selling stuff etc. They won’t think about how to pay back the loan just think about saving their life – that is the most important (HI 03-001).

Due, in part, to the government health insurance system, it is interesting to note that those that are most vulnerable medically are not necessarily the poorest. It is those households that are poor, yet not poor enough to be considered for the JAMKESMAS, that struggle the most with healthcare expenses. Particularly with regards to more serious medical concerns, such as those requiring in-patient care or surgery, households may have to opt for no care due to financial constraints. This may lead to decreases in human capital levels, and increased vulnerability overall.

While the government insurance programs provide a source of resilience for some households in the face of health issues, government funded community health programs also contribute to significant health resilience. PUKESMAS (*Pusat Kesehatan Masyarakat* - Centre for Public Health) centres contribute to affordable health services for villagers with and without government insurance coverage (HI 03-022; 4-013). Rates for services at PUSKESMAS range from RP 2,000 to RP 5,500 (\$0.20 - \$0.60 USD) for registration and medical fees (HI 03-006; 04-009; 05-003). Another component of health services is provided through POSYANDU activities organized by the women's organization (PKK). POSYANDU is a “community based vehicle to improve the health status of women and children that involves increased coverage of health care and intersectoral collaboration” (Leimena, 1989, p. 264). These activities focus on healthcare for young children and the elderly through the provision of nutritional education and health monitoring, as depicted in Figure 6.3.

Figure 6.3: POSYANDU Activities in Wonokromo Village



The implementation of the POSYANDU health programs in the late 1980s has contributed to the strengthening of women's organizations at the village in conjunction with improving availability and accessibility of health services. This contributes to resilience through increasing the health capital of villagers, as well as strengthening community organizational capacity.

6.1.3 Hazard knowledge and preparedness

At the *desa* level, there has been an increase in volunteer based organizations created to increase hazards awareness and implement DRR programming at the local level (HI 01-015). These SIBAT (*Siaga Bencana Berbasis Masyarakat* - Community-Based Disaster Preparedness) teams provide training to local villagers regarding hazards in the community, conduct earthquake simulations to increase capacity to respond, and help create disaster response plans at the community level (HI 01-015; 03-002; 03-022; 04-007). This has occurred in conjunction with recent efforts by the central government to implement national and provincial disaster management organizations as discussed in chapter 4. These improvements in disaster management organizations, in combination with increased awareness, provide evidence to support the position that the recovery effort contributed to increased risk awareness and disaster preparedness initiatives, thereby contributing to reduced vulnerability.

Despite the gains in hazard preparedness, many villagers commented on the ongoing need for further hazards knowledge and training. While some villagers attended courses on hazards and earthquake simulations, many household respondents were unaware of the physical processes that create natural hazards, the risk of hazards for their community, or how to reduce risk associated with those hazards (HI 01-003; 01-005; 01-007; 02-011; 03-012; 05-025). Many villagers noted that earthquakes and disasters are destiny from God, and that there is little that can be done to prepare; this point will be further discussed in the cultural capital section 6.7.

6.1.4 Human capital and disaster recovery

During the post-disaster period, the data indicate²⁰ that human capital levels in all five villages had a significant impact on recovery itself. As noted in chapter four, one of the more successful aspects of the recovery effort was the implementation of a community-based housing reconstruction program. The success of this community-based reconstruction program was particularly attributed

²⁰ These results were inferred from the post-recovery household interviews, community discussions and focus groups, as well as the expert interviews. The research did not measure pre-disaster human capital levels.

to construction skills among the villagers: villagers were able to rebuild their houses using their own construction skills and labour. In the case of Wonokromo, the most educated village where the majority of villagers worked as government officers and the number of construction labourers was quite low, many households had to hire external labourers. The majority of these labourers came from unaffected regions in Central Java province, including Magelang and Temanggung regencies (HI 04-003; 04-004; 04-007; 04-017; 04-024). Not only did lack of construction skills contribute to higher rebuilding expenses through the limited use of *gotong royong*, but in a few cases, this also created issues in terms of quality of building construction. Some of the hired labourers falsely advertised themselves as skilled construction labourers, although their quality of labour/skill was quite low. For a small number of households in Wonokromo, the lack of construction skill among hired labourers resulted in housing that did not meet the construction guidelines set forth by both the Indonesian government as well as JRF. These houses had to be torn down and rebuilt at the owner's expense in order to receive the next phase of funding (HI 04-005; 04-011). In other villages, the skill of construction labourers meant that households could construct their own houses, monitor labourers to ensure high quality building standards, and help neighbours rebuild their houses. The recovery effort also contributed to increased skill in construction as some villagers were able to receive construction training and skills through courses offered by the government and NGOs to increase awareness of earthquake resistant building standards (HI 01-024; 04-005). Thus, although some construction labourers may have had higher vulnerability levels in the pre-disaster context (due to unstable unemployment and lower income levels), construction skills contributed to increased resilience following the earthquake. This indicates there is a dynamic and temporal component to vulnerability and resilience levels: further discussion on the dynamic nature of resilience is provided in chapter seven.

While health facilities may have been over-extended in the period immediately following the earthquake, emergency medical services were provided free of charge for those impacted by the disaster through government health centres (Resosudarmo, Sugiyanto, & Kuncoro, 2008). Injured villagers were able to receive quality medical care without additional expenses and debts incurred on impacted households (HI 01-001; 02-006; 02-009; 03-019). Medical services were also provided free-of-charge from humanitarian organizations who established mobile field healthcare facilities in the aftermath of the disaster. These mobile health centres provided services for injuries and general health for any villagers who required assistance, regardless of whether they were impacted by the earthquake or not (HI 03-001). This was a positive aspect of the relief operation;

particularly for those families who did not have government sponsored insurance and may have suffered from ongoing medical issues but lacked the income to pay for quality healthcare services. While these free health services reduced vulnerability, and provided support and assistance in the immediate aftermath of the earthquake, the operational period was limited to the relief stage and has had limited long-term impact on the resilience of those households lacking funds to afford healthcare services.

The earthquake also contributed to psychological trauma that exacerbated vulnerability levels. Initial reports indicated that trauma levels were high in areas with heaviest impacts: children showed stress reactions, including sleeping problems, behavior issues (such as crying and anxiety) and fevers, whereas adults experienced flu-like symptoms and fear of beginning the rebuilding process and returning to work in agricultural fields (UGM & IRP, 2009). Although counselling services were provided in some villages for children (HI 03-015), some interviewees indicated that their children still suffered psychological trauma from the earthquake, including sleeping issues, (HI 01-003; 02-005). A number of adults also complained about ongoing trauma associated with the earthquake disaster (HI 01-017; 01-021; 01-022; 02-005; 2-010; 02-016; 02-017; 03-014; 03-015; 03-016; 03-017; 03-018; 03-020; 04-006; 04-007; 04-013; 04-019; 04-025; 05-021; 05-022; 05-023; 05-025; 05-027). In all villages, it was local community members who removed the injured and dead from the earthquake debris (HI 03-001; 04-008; 05-002). These experiences, along with the loss of family members, housing, and personal belongings contributed to long-term psychological trauma associated with the 2006 earthquake, and future earthquake or disaster events. This indicates that further attention on the long-term emotional and psychological aspects associated with disasters is required in order to effectively address different forms of recovery.

To summarize, within the context of human capital, the recovery effort contributed to both increased resilience as well as increased vulnerabilities. Recovery programming following the earthquake disaster did not have an impact on access to formal education levels, and in a small number of cases the disaster and ensuing costs of recovery reduced household capacity to pay education expenses, contributing to further vulnerability (HI 01-015; 03-023). In terms of skill levels, the recovery effort contributed to skill development for construction labourers who participated in training courses on earthquake resistant housing standards. Although free healthcare was provided for injuries sustained during the earthquake (HI 05-001), poor households that did not qualify for government healthcare insurance programs have continued to struggle with

healthcare costs, particularly for severe health issues. The recovery effort did contribute to reduced vulnerability through increased knowledge and awareness regarding earthquake resistant housing construction, although further follow-up is needed in terms of providing villagers with a strong hazards knowledge and preparedness base.

6.2 Social Capital

Social capital examines the different formal and informal social connections (both internal and external to the community) of households and communities as well as feelings of reciprocity, trust and exchange that provide the basis for social and economic interaction and activities (DFID, 1999). Table 6.2 provides an overview of the various social capital vulnerabilities and resiliencies for each village. This is followed by a comparison and discussion of the internal and external social assets of households and villages.

Table 6.2: Summary of Social Capitals

Village	Vulnerabilities	Resiliencies
Puton	Low levels of external networks, many have family in same area and were impacted by the earthquake; Lack of networks for employment purposes; Social jealousies from aid distribution; Lack of affordability of social organizations for poorest	Fair distribution of aid and sharing with neighbours; Strong external linkages of leader; Strong familial connections; Spirit of community togetherness (<i>gotong royong</i>); Strong community organization, particularly for women
Kategan	Low levels of external familial networks outside village; Lack of networks for employment purposes; Lack of affordability of social organizations for poorest; May have been an issue with corruption of aid	Fair distribution of aid and sharing with neighbours; Strong youth organization mobilized the distribution of aid; Strong familial connections; Improved spirit of community togetherness (<i>gotong royong</i>); Farmer's community organization at the <i>desa</i> level supports farmers; Community organizations (i.e. <i>dasa wisma, arisan</i>)
Wonokromo	High levels of social conflict and social jealousies; Competing religious and government leaders leads to social fragmentation; Lower levels of community solidarity due to individualistic attitudes	Strong familial connections provided support for recovery; High levels of external linkages to military, religious organizations and private institutions; Strong community organizations and structures, particularly religious organizations; Strong community heritage and shared ancestry
Ngandong	Lack of affordability of social organizations for poorest;	Strong government and community organizations; Strong familial connections; Improved spirit of community solidarity (<i>gotong royong</i>); Stronger networks for employment purposes compared to villages in Bantul

Sengon	Lack of external networks for employment leads to high unemployment levels; Some levels of social conflict from aid distribution	Strong familial connections provide support during recovery and economic hardship; Strong spirit of community solidarity; Strong community organizations
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6.2.1 Internal Social Capital

Family and kinship networks have been identified as a critical social mechanism for increasing resilience to disasters, particularly during the post-disaster period as a resource to provide material and non-material support (Kirschenbaum, 2006). Evidence from the 2006 Yogyakarta earthquake supports this premise, as all surveyed villagers noted that they received assistance from family members in the immediate aftermath of the disaster. Assistance took a variety of forms, including food and material goods for emergency support (HI 01-003; 02-008; 03-018; 04-006; 04-011; 04-022; 05-019), labour assistance for reconstruction of temporary and permanent shelter (HI 03-011; 03-022; 05-004), financial support for rebuilding housing (HI 01-004; 02-001; 03-002), and sheltering family members during the immediate aftermath period (HI 003-005; 4-001; 04-007; 05-013; 05-014). Among many of the poorest households, villagers noted that their family members lived in the same village, so it was difficult to provide financial and material support as they were also impacted by the earthquake, thereby increasing their vulnerability (HI 01-010; 02-012; 05-001; 05-003). In these cases, family members did provide emotional and psychological support for recovery. In fact, when asked what gave them strength to recover from the disaster, 51%²¹ noted family as an important support mechanism.

While familial support was unequivocally recognized as a resilience factor for recovery after the earthquake, the impact of informal community support and networks was more complex and differed by village. In Puton, Kategan and Ngandong, the majority of villagers felt that aid was distributed fairly and there were limited conflicts during the immediate response and recovery periods. On the other hand, Wonokromo experienced a high degree of social conflict, as did Sengon where there was no *desa* level leader and numerous cases of corruption (HI 01-006; 02-003; 03-006; 04-003; 04-006; 04-021; 04-024; 05-016; 05-010). Supportive aspects of community networks are evidenced through villager comments highlighting households sharing aid and assistance with their neighbours. In regards to the immediate response and relief assistance

²¹ Of the 114 interviewees who responded to this question, 58 highlighted their family as a source of support. Respondents were allowed multiple responses - in total, 146 responses were provided, with 68 (or 47%) highlighting family as a support mechanism for recovery after the earthquake.

provided, almost all respondents felt that they received adequate short-term emergency relief supplies. Although there were some minor complaints, these usually revolved around requests for specific conditions, including milk for infants, and medicine for high blood pressure (HI 01-008; 01-018; 04-020; 04-022; 04-024; 05-008; 05-016). In a small number of cases, villagers complained that neighbours around them received assistance that they themselves did not receive. This was particularly evident for a cooking tools program organized by the regency level governments in Bantul and Klaten (HI 02-013; 03-018; 03-019; 05-025). As the relief assistance was generally organized at the village level, individual villages may have had different experiences with organization and distribution depending on the capacity of local governance and community structures.

Private donations from friends, family members and private companies provided a number of households with more than enough assistance. In these instances, the aid was shared with neighbours and others within the community (HI 01-007; 01-023; 02-002; 02-007; 02-012; 03-003; 03-007; 04-005; 04-008; 04-011; 05-028). This spirit of giving and support contributed to feelings of togetherness within the village that several households highlighted as an important support mechanism after the earthquake (23% of interviewees highlighted community solidarity as a factor providing strength for recovery). In one instance, an interviewee described how the villagers had run to the hills after the earthquake due to the false tsunami warning. One of the villagers had run to the hills without clothing and needed assistance to cover her body. The interviewee gave her the sarong she was wearing and used pieces of her husband's clothing to cover herself as well. She highlighted this story as a positive experience that made her grateful that she was still able to share something with her neighbours even in a difficult situation (HI 01-018). This highlights the role of internal social capital networks as a contributing factor in resilience levels.

To varying degrees within all villages, conflicts over aid distribution and levels of assistance created social jealousies and conflict, highlighting vulnerabilities related to social capital (HI 01-001; 01-005; 02-015; 04-003; 04-007; 04-009; 05-016). Both Wonokromo and Sengon had issues with corruption of aid, as well as increased levels of conflict and dissatisfaction with aid distribution (HI 04-003; 04-004; 04-005; 04-012; 05-002; 05-010; 05-016). In particular, Wonokromo has had ongoing issues with social conflict between villagers supporting different government and religious leaders - this issue will be discussed further in the political capital section as well as the cultural capital section. In Puton, Kategan and Ngandong, a small minority of

villagers noted that they felt they did not receive some aid items that other villagers did (HI 01-005; 02-015; 03-018). In these instances it was difficult to determine whether these comments were a reflection of unfair aid distribution, or, as indicated by other villagers, could be attributed to some villagers receiving more through familial and personal network donations (HI 01-017; 02-023). Generally, families who received extra aid through personal assistance shared among neighbours and friends. A small number of villagers felt that these personal donations should have been reported to the *kepala dusun* in order to be distributed equally throughout the village (HI 04-012; 04-024). These examples highlight a drawback of the tight social structures found in each village: the higher degree of community togetherness and involvement may increase the likelihood for dissatisfaction and conflict. This raises important questions about how official relief and recovery assistance can be distributed alongside personal assistance in a fair manner that is culturally appropriate and reduces social conflict within villages.

A variety of community structures, including government and community organizations were used during the recovery effort in order to assist in the distribution of aid and recovery programs, accentuating social capital resiliencies. These include the neighbourhood RT leaders who collected data and distributed aid among the neighbourhood, as well as the village women's organization (*Pemberdayaan Kesejahteraan Keluarga* (PKK) - Family Welfare Movement) and the youth groups. These strong organizational structures at the *desa* and *dusun* level provided the decision-making structures as well as the support and capacity to implement a community-based recovery program that distributed aid throughout the villages (HI 02-003; 02-006; 02-001; 03-003; 03-006). A variety of pre-existing community organizations also contributed to conditions of resilience in the villages, such as the PKK, *Arisan*, as well as post-disaster farmer's organizations established by the PNPM Mandiri government program. The PKK helps to organize the POSYANDU health activities for children and the elderly as discussed above, as well as promoting family development activities, such as the newly implemented preschool playgroups in all villages (HI 04-007; 05-006). One villager noted that her involvement in the PKK and POSYANDU activities "makes me feel confident even though I'm not high educated. It makes me respected by other people" (HI 01-008). This demonstrates the effectiveness of these social organizations to both provide services to community members, as well as increase organizational capacity and resilience at the village level.

The *Arisan* program is a community-based social group that also provides credit and savings services. The program is organized at either the *RT* or *dusun* level. Members meet on a weekly or

monthly basis and contribute a small fee (approximately RP 5,000 or \$0.50 USD) which is then allotted to a member on a rotating or lottery basis. The system provides a method for saving and credit, as well as a social gathering to discuss and solve issues and problems (HI 01-006; 02-022; 03-025). Although the *arisan* program provides important resiliencies for many households, these benefits do not seem to extend to the poorest households as they do not have the financial capital to be able to contribute to the savings program on a weekly or monthly basis (HI 01-009; 02-014; 02-020; 03-024). Thus, for some of the poorest households, a lack of ability to participate in certain social capital structures further increases their vulnerability, as they are excluded from the resilience these organizations provide.

Part of the post-disaster recovery process included the creation of new community organizations designed to increase resilience levels, particularly among poorer agriculturalists. A farmer's organization was established by the PNPM Mandiri program (*Program Nasional Pemberdayaan Maskarakat* - National Program for Community Empowerment) after the earthquake and implemented at the *desa* level to provide a support mechanism for farmers. The purpose of the program is to increase farmer knowledge on coordinating schedules for planting and growing rice cultivating patterns and rotating crop cycles to fit the seasons, and providing training for using fertilizers and pesticides (HI 02-009; 03-005). Farmers involved noted the program's contributions to increasing knowledge and skill in farming techniques and positive impacts on crop yields (HI 02-009; 02-023). A further contribution related to improvements in social networks, and allowed one member to start a small brick factory through newly established partnerships (HI 02-023). This is indicative of the ability of local community organizations to contribute to resilience improvements through increases in welfare, networks and ongoing livelihood initiatives.

6.2.2 External Social Capital

During the recovery effort, linkages between villagers and external networks, termed bridging capital, was a key resource for attracting aid and recovery programming: this demonstrated resilience to cope with the disaster. Villages with leaders and members with strong external connections were able to obtain a greater amount of goods and materials during the immediate response phase and to increase funding for house reconstruction and social programming to improve overall community conditions. Particularly in Puton village, *Ibu X* was able to attract a variety of NGO and university partnerships for recovery and development programs, suggesting a higher degree of resilience (CM-01). Unfortunately, the majority of this bridging capital was held

by *Ibu X*, so it is unclear whether this capital would be carried over to other villagers. Another example is Wonokromo village, where a number of villagers and leaders had external connections, particularly through religious organizations and schools, as well as connections to high-ranking government officials (CM-04; HI 04-001; 04-008; 04-011). In other villages, particularly the poorer communities of Kategan and Sengon, which are comprised mainly of construction and farming labourers, external networks were limited. The lack of external linkages negatively impacted the amount of aid and recovery initiatives that were implemented in these villages, thereby reducing resilience levels (HI 02-012; 05-002).

While external networks to organizations provided immediate assistance for recovery from the earthquake, many respondents noted that external networks were also a key resource for obtaining stable employment and promoting entrepreneurial activities (HI 02-004; 03-006). This was particularly true for the construction industry, which employed a majority of the male villagers in the case study sites, although not always on a stable basis (construction labour positions were held almost exclusively by men, although anecdotal evidence suggests a small number of women work as construction assistants although their pay is lower than their male counterparts). In Ngandong, many of the villagers noted that there was steady employment through their networks for employment in Yogyakarta city, highlighting their resilience (HI 03-003; 03-004; 03-006; 03-010; 03-025). In other villages, namely Sengon, Kategan and Puton, high unemployment levels for labourers were attributed to a lack of networks which would allow for employment in construction projects, indicating increased vulnerability (HI 02-020; 05-006; 05-012). For construction labourers from Puton and Kategan, this unemployment was exacerbated by project managers' preference for hiring construction labourers from Klaten due to their perceived willingness to work for longer hours and lower pay (HI 01-021; 03-003). In terms of entrepreneurial activities, external networks were required in order to market products made at the village level, such as food, clothing and handicrafts. While the earthquake recovery effort provided training for the production of these products, the lack of established external networks limited the effectiveness of these programs and rarely contributed to significant changes in livelihood activities (HI 01-004; 01-008; 01-016; 02-008; 03-003; 03-007; 05-024; 05-027). Overall livelihoods programming will be further discussed in chapter seven.

6.2.3 Social Capital and Disaster Recovery

To summarize the impact of social capital on the recovery effort, strong social capital resources, at both internal and external levels (i.e. bridging and bonding capital), demonstrated resilience and increased the capacity of households and villages to obtain materials goods and funding, as well as non-material support for reconstruction and recovery programs. Villagers received support through horizontal and vertical linkages, including family, friends, private companies, and strangers, as well as government and NGO sources (HI 01-005; 01-007; 01-008; 01-022; 02-024; 03-001; 03-023; 05-001; 05-014). In many cases, higher levels of bridging capital contributed to increased resilience through assistance and recovery programming, as evidenced by the recovery experiences in Puton and Wonokromo. While the earthquake disaster and subsequent distribution of aid increased social conflict to some degree, many of villagers believed the earthquake and recovery experience brought their community closer together and actually increased the spirit of community togetherness, thereby reducing overall vulnerability (HI 01-003; 02-013; 02-024; 03-008; 03-012; 03-018; 04-017; 04-025; 05-007; 05-015; 05-027).

Recovery programming also had positive impacts on vulnerability levels. Through the implementation of a community-based reconstruction effort, the recovery effort continued to support the capacity of local village institutions to respond to the disaster in their communities, and strengthened the spirit of community solidarity through working together to recover their households and villages. Establishment of new community organizations, such as the farming cooperatives and the community-based disaster preparedness organizations further supports community capacity and the development of social capital networks.

While there were some positive impacts on resilience levels attributed to the recovery effort, the research revealed that recovery programming had limited impacts on social capital networks for livelihood opportunities. The recovery program did little to improve economic networks, limiting the effectiveness of training and livelihood programming due to lack of marketing skills. In order to increase the effectiveness of livelihood interventions, social network development and marketing training is required in order to provide villagers with the capacity to effectively promote and sell their products. This will be discussed further in the livelihoods section in chapter seven.

6.3 Physical Capital

Physical capital comprises the infrastructure and production tools that contribute to livelihoods and reduce vulnerability to disasters (DFID, 1999). In the context of Yogyakarta, as there was limited damage to the relatively well-developed transportation and communication networks, the focus of this section will be on the provision of transitional shelter following the earthquake, building standards for permanent housing reconstruction; water, sanitation and electrical infrastructure; as well as production tools. Figure 6.3 outlines the various vulnerabilities and resiliencies associated with physical capital.

Table 6.3: Summary of Physical Capitals

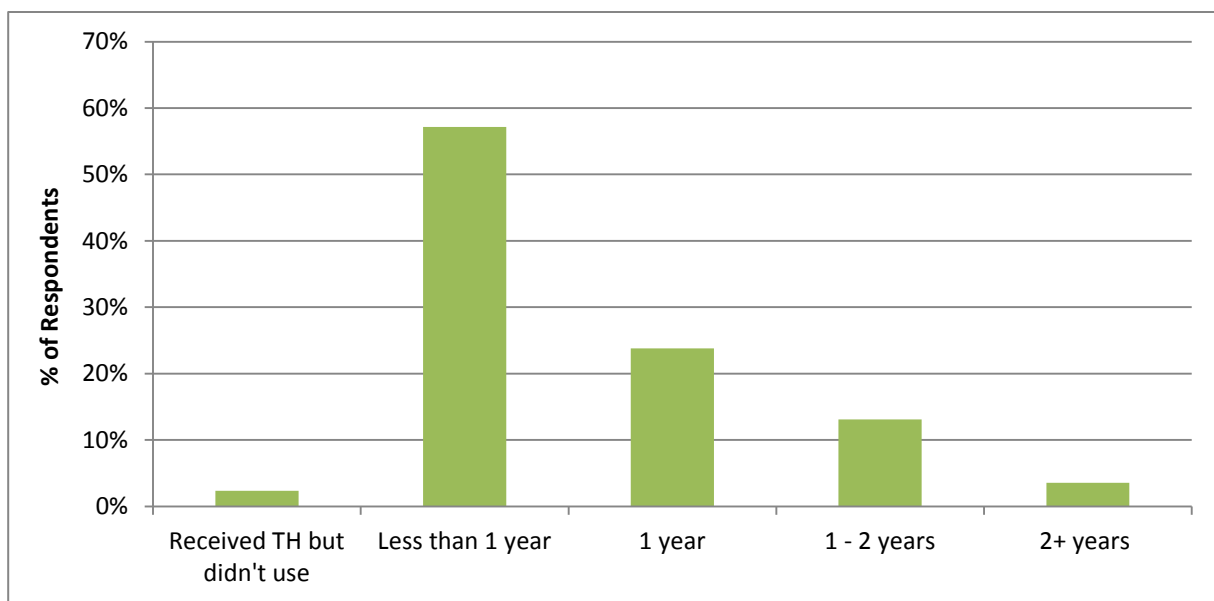
Village	Vulnerabilities	Resiliencies
Puton	Although improved, building standards remain low and ongoing monitoring of building code remains non-existent; Lack of electrical infrastructure for poorest households	Improved housing construction; Improved sanitation, water, and electrical infrastructure after earthquake; Some improvement of livelihood tools after earthquake (sewing machines, construction tools etc.)
Kategan	Although improved, building standards remain low and ongoing monitoring of building code remains non-existent; Lack of electrical infrastructure for poorest households; Loss of livelihood tools after earthquake led to business closures and losses	Improved housing construction and condition; Improved sanitation, water, and electrical infrastructure after earthquake; Improved irrigation structures led to increased crop yields
Wonokromo	Loss of business infrastructure and livelihood tools after earthquake led to business closures and losses	Improved housing construction and condition, particularly for poorest; Improved sanitation facilities for poorest
Ngandong	Irrigation systems are not working properly, impacting crop yields;	Improved housing construction and condition; Improved sanitation (toilet and septic tank facilities)
Sengon	Density of residential buildings; Reduced water quality since the earthquake	Improved housing construction and condition; Improved toilet facilities following earthquake

6.3.1 Transitional Shelter

In the months following the earthquake, the relief effort continued to support impacted villages through the provision of basic needs and temporary bamboo shelters (Manfield, 2007; UN-HABITAT, 2008). The transitional or ‘two-step’ shelter effort was exclusively funded by the humanitarian sector through the provision of bamboo housing that was constructed using the community spirit of *gotong royong* (JRF, 2008; Manfield, 2007).

Of the 110 interviewed households providing responses, a total of 84 households, or 76%, received transitional housing. Figure 6.4 provides an overview of the length of time the households who received temporary bamboo housing used this form of assistance as their primary shelter facility. Focusing on those households who received transitional housing, over half used the bamboo shelter for a period of less than one year. In fact, of the 48 households living in transitional shelters for less than one year, 87% resided in these shelters for less than six months. Using the bamboo shelters for such a short time period suggests that the cost-effectiveness of temporary sheltering may have been limited in the context of the 2006 Yogyakarta recovery effort. These numbers, in conjunction with villager comments regarding hiring labourers to rebuild their permanent homes as quickly as possible, also provides evidence to support the Central government position regarding the one-step housing solution. On the other hand, of those households receiving transitional shelters, almost 40% resided in their shelters for one year or more, with a small number of households using bamboo housing for over two years. In fact, the interviewees who noted they lived in transitional bamboo housing for over two years were still using the bamboo shelters as their primary shelter facility during the research period (approximately five years following the earthquake).

Figure 6.4: Length of Time Transitional Housing (TH) Used for Living*



*n = 84

While the results may support the one-step housing policy, there is evidence to suggest that the responses provided by some villagers may be inaccurate. For example, an interviewee would note that they lived in an emergency tent for one month following the earthquake, and then two months in the bamboo shelter before returning to their reconstructed permanent house. During the same interview, the villager indicated that they waited until they received government funding to begin the reconstruction of their housing – the distribution of which didn't begin for six to eight months following the earthquake. These villagers would have lived in some form of temporary housing for at least six to eight months, although their responses stated they only lived in temporary housing for three months. As a result, it is difficult to provide conclusive evidence regarding the length of time villagers were residing in their temporary housing structures as there is reason to suggest some of the evidence may be erroneous.

While the length of time villagers resided in bamboo shelters may be inconclusive, the research suggests the implementation of the transitional housing effort contributed to increased community solidarity and mutual cooperation. The transitional shelter program was designed to incorporate local techniques, knowledge and cultural systems (MacRae & Hodgkin, 2011). As will be discussed in section 6.7.2, villagers used the community spirit of *gotong royong* to support the construction of temporary housing. Villagers also identified the community spirit of togetherness as an important aspect in providing strength and motivation to recover after the disaster. Thus, the humanitarian response effort effectively integrated various forms of capital resiliencies available in the region in order to implement a temporary housing solution that appropriately made use of local resources, knowledge and labour.

6.3.2 *Permanent reconstruction and building standards*

As noted in section 4.2.2, the earthquake resulted in substantial damages to buildings due to poor construction standards and low quality building materials (BAPPENAS et al., 2006; Elnashai, et al., 2007; Sarwidi, 2007). Thus, the recovery effort focused on building reconstruction and the majority of government and JRF recovery funding was used to finance the reconstruction effort (MacRae & Hodgkin, 2011). To a lesser extent, various humanitarian aid organizations provided support for housing reconstruction in some villages (Manfield, 2007). As noted in section 4.3.1, the reconstruction of buildings focused on increasing resilience levels by rebuilding to earthquake resistant standards (JRF, 2008).

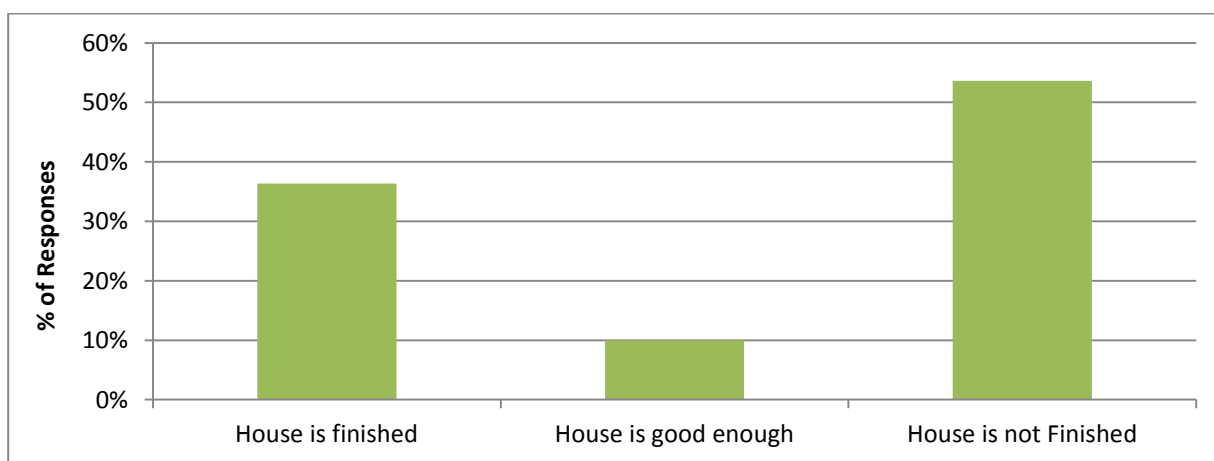
Structural damage to housing was classified in three categories: complete destruction, medium damage, and low damage (HI 01-019). In Bantul, villagers in the ‘total damage’ category were given RP 15 million (approx. \$1,600 USD) to rebuild their houses, whereas villagers with total damage in Klaten were provided with RP 20 million (approx. \$2,100 USD)²². This difference can be attributed to additional funds that were provided by the Central Java government to assist households to rebuild their houses (CM-03, CM-05). Villagers in both Bantul and Klaten noted the funding was insufficient to rebuild a house, and only allowed for reconstruction of the foundation, walls and roof (HI 01-008; 01-014; 02-003; 02-004; 02-007; 02-020; 03-002; 03-004; 03-005; 03-024; 04-012; 05-001; 05-002; 05-012; 05-022). Any additional reconstruction costs were absorbed by the household through savings, selling of assets, financial assistance from family members, as well as through credit (HI 01-002; 04-014; 01-025; 02-002; 02-014; 02-025; 03-001; 03-011; 03-020; 04-013; 05-001). This has created a vulnerability for a number of households in the ‘total damage’ category, as they have been unable to replace their savings and assets used to fund reconstruction after the earthquake disaster (HI 01-002; 01-014; 01-025; 02-002; 02-020; 03-011; 03-005; 04-013; 05-004; 05-017). Households with medium levels of damage received RP 4 million (approx. \$420 USD), and low damage households received RP 1 million (approx. \$110 USD): these amounts were also considered insufficient for fixing damages and retrograding existing structures (HI 01-019). Conversely, a small number of villagers thought that the government funding was sufficient as they were grateful for the assistance that was provided and the provision of too much assistance would lead villagers to be dependent on government aid (HI 01-007; 01-024; 02-013; 03-014). This raises complex questions for government and humanitarian response agencies regarding how to provide appropriate levels of assistance without contributing to aid dependency.

The data regarding house completion supports the assertion that there was a lack of funding for housing reconstruction. Figure 6.5 outlines villager responses to a question of whether they believe their house is finished or not. The graph suggests that approximately one third of interviewed respondents have completed housing reconstruction, whereas over half have not. These responses highlight ongoing reconstruction issues, three years after all funding for housing reconstruction had been dispersed and the Indonesian government officially declared the reconstruction effort finished

²² Although respondents in the case study sites in Klaten indicated they received 20 million RP, other data and expert interview comments suggest that funding distribution was not as well done in Klaten as compared to Yogyakarta province (MacRae & Hodgkin, 2011). In some cases, data suggests that households in Klaten received an average of just 5 - 7 million RP for house reconstruction (E-02).

(HI 04-021). While all households have at least basic shelter, with cement foundations, brick walls and tiled roofs, many considered the level of finishing incomplete, and in some cases, unsuitable (HI 01-008; 01-016; 02-003; 02-025; 03-007; 04-012; 05-001; 05-012). Difficulties completing the reconstruction of housing were almost exclusively related to lack of funds to complete finishing touches, such as flooring, windows and doors, as well as cementing and painting walls (HI 01-001; 02-022; 03-006; 05-002; 05-003; 05-015). As households struggle to continue funding the ongoing housing reconstruction, this may contribute to increased vulnerability through a lack of funds for other expenses (e.g. human capital expenses such as health and education), as well as limited ability to save (i.e. impacting financial capital levels).

Figure 6.5: Housing Reconstruction after the 2006 Yogyakarta Earthquake*

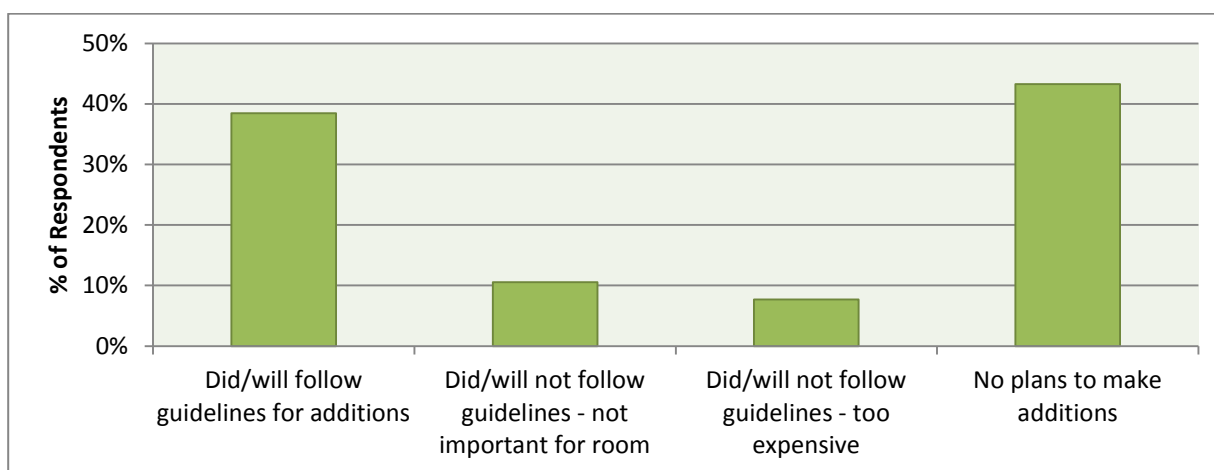


*n = 110

While respondents highlighted shortfalls in funding, the reconstruction of housing using earthquake resistant standards and associated public education programs appeared to have significantly contributed to increases in earthquake resistant housing and awareness of building standards. Eighty-eight percent of household respondents believed that their house was earthquake resistant due to construction methods which followed government guidelines. A further 8.5% believed that their house is resistant enough to allow time for residents to escape in the event of a future earthquake, although they do believe the house could still be damaged or destroyed. Only 3% of household respondents believed their house was not earthquake resistant due to the fact that they did not follow the construction guidelines, in most cases because they rebuilt their houses using their own funds or because they spent the house funding on other expenses (HI 03-023; 05-007; 05-025). The results are slightly higher than other studies that suggested approximately 80%

of reconstructed houses followed the construction guidelines (E-17). Although the vast majority of households followed the construction guidelines, this was not done on a purely voluntary basis: during the reconstruction period there was monitoring by government and JRF employees and funding was tied to following construction standards. To determine whether these guidelines had been internalized by earthquake survivors, interviewees were asked whether they would use the earthquake standards when constructing additions to their houses (or if they had already made additions, whether they followed the guidelines). Figure 6.6 summarizes the household responses.

Figure 6.6: Earthquake Resistant Guidelines for Housing Additions*



*n = 104

From Figure 6.6, 68% of the interviewees who had already made or were planning to make additions to their houses declared that they either did, or would, follow construction guidelines. A further 10% indicated that they did not use the guidelines only because the addition was not considered an important room for the house (such as a terrace, dirty kitchen or external bathroom facility). This relatively strong support for the guidelines suggests a shift in thinking towards construction and earthquake resistant standards, highlighting the connections between physical and human capital. Furthermore, Figure 6.6 provides a strong indication that the recovery program has contributed to reduced vulnerability through stronger housing construction, as well as increased resilience through awareness and desire to increase construction standards.

Perceptions of the quality of reconstructed permanent housing also reflected a shift from pre-disaster housing. Particularly for the poorest villagers, housing reconstruction programs provided some households the opportunity to have brick and cement housing, which is generally considered

more modern and higher class compared to bamboo houses (HI 2-013; 02-020; 02-025; 03-002; 03-009; 03-012; 03-020; 04-001; 04-009; 04-011; 05-008; 05-019; 05-023). Alternatively, for the wealthier households, the reconstruction effort generally resulted in smaller houses, some of which have not been completed over four years after the earthquake (HI 02-017; 03-016; 03-020; 05-001; 05-021). This is summarized by one interviewee who noted:

For the middle income and poor people, POKMAS has many advantages because before the earthquake they cannot have proper house but now they have a better house. Yet for the rich people, POKMAS has a negative effect because they have to follow the guidelines so for them 15 million is not enough and they have to use their own money to fix the house (HI 04-005).

A significant change linked to the recovery effort was the provision of housing to multi-generational families that were previously living in one house. In traditional Javanese households, it is typical for multiple generations of families to live in one house (CM-01). Due to the limited funding provided by government sources, many families resorted to building smaller houses after the earthquake, which made it more difficult for multiple families to live in the same structure. Thus, JRF provided fill-the-gap funding, particularly for households where multiple families were residing. This allowed the construction of separate housing for each family: households who received secondary housing were grateful to have their own house and live separately from other families (HI 01-004; 01-010; 03-007; 03-021; 03-022; 04-009; 04-024).

One aspect of quality of housing reconstruction that should be noted is the extent to which earthquake resistant guidelines were followed. In some cases, households may indicate that they have followed guidelines, although the quality of construction may remain lower. For example, households may have improved awareness regarding the requirement of reinforcement iron bars, although they did not use the standard thickness (i.e. 10mm), instead using a smaller size (i.e. 8mm or 6mm) in order to save costs (E-06). In the majority of cases, the walls of housing have been filled from floor to ceiling with brick and mortar, increasing the likelihood of injury due to collapsing walls²³ (E-02). While the household surveys in this research did not specifically assess housing construction, expert interviews and observation of housing indicated there are ongoing issues with quality of housing construction in the region. Furthermore, many of the procedures implemented during the reconstruction program, including permit, monitoring and retrofitting

²³ Construction standards highlighted a housing model whereby the upper portion of walling would be built with a lighter building material, usually bamboo, in order to reduce the risk of injury from collapsed walls in future earthquakes (E-02).

initiatives, have reverted back to pre-disaster form following the completion of the recovery funding (E-17). This suggests that although the housing reconstruction program contributed to resilience through increased awareness and improvements in earthquake resistance of buildings, the need for ongoing education and emphasis on quality construction remains.

6.3.3 *Water, sanitation and electrical standards*

Many interviewees reported improvements in access to water, sanitation and electricity connections in the research villages, particularly for the poorest households. In Puton village, negotiations with the NGO Cordaid led to the provision of septic tanks to be shared between two households, and the provision of toilets for each household. Consequently, the sanitation conditions for several households improved as they had previously used the nearby Opak River for these purposes (HI 01-005; 01-011; 01-016; 01-022). While certain households noted improvements in electrical access (HI 01-001; 01-006; 01-009), other households noted the high cost associated with purchasing the electrical meter and wiring the house (approximately RP 2 million or \$210 USD) compared to the amount of funding available for reconstruction (HI 01-011; 01-014). Similar situations were found in the remaining four villages: households either had access to electricity, wells, septic tanks and toilets prior to the earthquake, or access improved after the earthquake (HI 02-002; 02-013; 02-014; 02-022; 03-003; 03-005; 03-009; 03-012; 03-014; 04-007; 04-014; 04-021; 05-013; 05-019; 05-022). In Sengon, the earthquake contributed to significant issues with water turbidity and poor water quality in household wells. Although the Indonesian Red Cross (*Pelang Merah Indonesia* - PMI) implemented a clean-up initiative, households reported having to use a pump and filter to clean the water (HI 05-001; 05-003; 05-004; 05-022). Although the data suggested ongoing issues with water quality in Sengon, the vast majority of households noted access to water, sanitation and electricity facilities either remained the same following the earthquake, or improved, particularly for the poorest households. Hence, there was an overall reduction in vulnerability related to infrastructural physical capital. Furthermore, the connections between water and sanitation facilities and overall health could also contribute to vulnerability reduction related to human capitals.

6.3.4 *Production tools*

For many households in all villages, the earthquake resulted in destroyed home businesses and associated production tools, further increasing overall vulnerability levels. Construction labourers

lost tools, fish breeding pools were destroyed, tailors lost their sewing machines, chicken and quail pens were destroyed along with livestock, machines for recycling and garment businesses were destroyed, and food producers lost cooking utensils (HI 01-007; 02-009; 03-001; 03-006; 04-001; 04-007; 04-010; 05-006). The recovery programming included some assistance to support livelihood activities and the replacement of production tools, particularly through improved access to credit programs, replacement of building tools for the reconstruction program, and the PNPM Mandiri sewing program that provided training and sewing machines (HI 01-024; 03-016; 04-014; 05-018). Unfortunately, many households did not receive assistance to support the re-establishment of their businesses, and some small businesses and entrepreneurial activities were discontinued.

Livelihood support varied across the research villages, with some communities receiving more assistance than others. As noted in Puton, there were a number of programs to help households establish or re-establish entrepreneurial activities, including animal husbandry, fish breeding, food production, and fruit trees (CM-01). On the other hand, there was limited assistance in Kategan in terms of production tools and livelihoods initiatives, in conjunction with very low external social capital resources as discussed above. As a result, there have been limited livelihood improvements in Kategan, resulting in a further perpetuation of vulnerability levels (HI 02-002; 02-008; 02-011). In Wonokromo, many households were employed in public sector positions and the need for livelihoods interventions was lower, although there were negative impacts on some small businesses. In two instances, the damages to garment and recycling machinery led to the closure of successful businesses, and the business owners began working in seasonal employment as construction labourers (HI 04-007; 04-013). Economic conditions for these households were significantly reduced, leading to overall increases in vulnerability. In Ngandong, a large number of households had stable incomes through involvement in breeding quail eggs prior to the earthquake (HI 03-001; 03-006; 03-007; 03-008; 03-009; 03-015). The majority of these businesses were suspended after the earthquake due to the death of the majority of quails, as well as the destruction of pens and stables. The devastation suffered by these businesses was further exacerbated in 2007 when the Avian influenza outbreak meant that all surviving quails had to be destroyed (HI 03-008; 03-009; 03-015). While certain households could use credit to re-establish their businesses, at the point of the research, the majority of networks for selling the eggs had been estranged and taken up by quail breeders in other areas (HI 03-007). Loss of sales arrangements following the earthquake was also noted by other business owners, such as *warungs*, tailors and garment industries (HI 04-

016; 05-018). This provides some indication of the need for immediate livelihoods support in the post- disaster period in order to maintain business relations and marketing networks.

In terms of agricultural production tools, there was some level of post-disaster assistance in order to replace or improve irrigation facilities. In Kategan, reconstruction and enhancement of irrigation structures and paddy field management through JRF funding and the PNPM Mandiri program have increased access to physical capital for livelihoods purposes (HI 02-002; 02-023). On the other hand, construction of irrigation and drainage structures designed to improve agricultural conditions in Ngandong through JRF funding had a negative impact: the newly constructed drainage channels have led to further unintended flooding of agricultural fields (HI 03-003; CM-03). This suggests mixed vulnerability reduction and resilience building in the agricultural sector due to ongoing, underlying issues associated with environmental change and degradation.

6.3.5 Physical Capital and Disaster Recovery

For the majority of households, the transitional and permanent housing reconstruction effort contributed to reduced vulnerability through improvements in the quality of building construction and a shift in attitudes towards safety and earthquake resistant construction guidelines. In particular, the permanent housing recovery effort improved conditions for the poorest, most vulnerable households, although due to the amount of funding provided, many houses remained incomplete four-to-five years following the earthquake.

Recovery programming also contributed to resilience through improvements in access to water, sanitation and electrical infrastructure. This was predominantly evident for poorer households, with improvements particularly noticed in sanitation facilities. Despite these improvements, the costs associated with electricity hookups were prohibitive for a small number of households, resulting in sharing of electricity sources.

The earthquake resulted in severe damages to livelihoods and entrepreneurial activities, particularly production tools and capital assets involved in livelihood initiatives. To a certain degree, livelihood assistance and productive tool replacement was implemented, although this has achieved little in terms of improving livelihood conditions in all villages, thereby resulting in stagnating or, in some cases, increased vulnerability levels. This is discussed further through an in-depth analysis of the livelihood programming provided in chapter seven.

6.4 Financial Capital

Financial capital denotes the financial resources that individuals and households use to achieve livelihood objectives and face external stresses and shocks (DFID, 1999). These type of resources can take many forms and include related issues, such as savings (in cash and liquid assets), access to credit, security of employment and stability of income, levels of poverty and equity, strength of local economies, and diversity of livelihood opportunities (from Table 3.1). In the context of recovery from the 2006 Yogyakarta earthquake, the following section will explore vulnerability and resiliencies related to access to financial resources under two key themes: employment and income levels; as well as savings and credit programs. Table 6.4 provides a summary of the vulnerabilities and resiliencies associated with financial capital in each village.

Table 6.4: Summary of Financial Capitals

Villages	Vulnerabilities	Resiliencies
Puton	Low income levels; Seasonal, unstable employment; High unemployment levels; Lack of access to credit and loans for poorest; Lack of savings; Lower asset levels after earthquake (assets sold to support recovery)	Low-interest credit programs through <i>koperasi</i> and other micro-financing programs; Some level of savings/community savings plans (<i>arisan</i>); Access to informal credit and savings facilities; Increased diversity of employment opportunities; Community taxation plan for development activities
Kategan	Very low income levels; Very high unemployment levels; Seasonality of employment; Lack of savings; Lower asset levels after earthquake (assets and savings used to support recovery effort)	Improved access to low-interest credit programs through <i>koperasi</i> , <i>arisan</i> , and other micro-financing programs; Access to informal credit and savings facilities; Some level of savings; Some income diversity through chicken, goat and cow breeding
Wonokromo	Some unemployment and unstable/seasonal income, particularly for labourers; Lack of savings and assets for poorest members in village	Low unemployment levels; Stable incomes for many households; Improved economic and business conditions following earthquake; Access to credit programs; Majority of villagers have some level of savings
Ngandong	Lack of savings and assets after earthquake (used for recovery purposes); Credit facilities mainly used to support daily living needs; Seasonal employment leads to unstable income; Lower income levels due to poor crop yields; Loss of turtle cattle and quail businesses after earthquake	Access to low-interest credit programs through village bank (BGD) and LKD; Access to informal credit and savings facilities; Low levels of unemployment
Sengon	Credit facilities mainly used to support daily living needs;	Improved access to low-interest credit programs; Access to informal credit and savings facilities;

	High unemployment rates, among both farming and construction labourers; Seasonal employment leads to unstable income; Lack of savings	Many villagers have some savings in jewelry, land or livestock
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6.4.1 Employment and income levels

As noted in Chapter 5, unemployment levels in three of the villages, Puton, Kategan and Sengon, presented a serious vulnerability for several households in terms of maintaining a stable income and meeting their daily living needs. In Puton and Kategan, high unemployment levels among the male population were attributed to lack of construction labourer positions due to positions being replaced by workers from Klaten, as well as seasonality of agricultural activities (HI 01-007; 01-021; 02-001; 02-012; 02-018). Kategan villagers also highlighted low education levels and lack of networks, as noted in above sections (HI 02-018; 02-023). One villager estimated the unemployment rate in Kategan to be approximately 50% (HI 02-028). In Puton and Kategan, women were the primary income earners (through farming labouring or home-based business activities) in many of the interviewed households. In Sengon, high unemployment was ascribed to poor agricultural conditions as well as lack of construction projects requiring labourers, thereby impacting both male and female labourers (HI 05-001; 05-002; 05-006; 05-017). By comparison, unemployment levels in Ngandong and Wonokromo were relatively low. In Wonokromo, many villagers worked as public sector employees, and therefore, had stable, reliable incomes, with several households noting that unemployment was not a problem (HI 04-001; 04-008; 04-010; 04-011; 04-014; 04-025). For the small minority of villagers working as labourers, lack of employment and seasonality of job availability were similarly highlighted as vulnerability issues (HI 04-009; 04-023). Villagers in Ngandong noted improvements in employment following the earthquake, as networks increased during the reconstruction effort (HI 03-003; 03-004; 03-010). This has resulted in an improvement in living conditions and local economic conditions in Ngandong indicating a reduction in overall vulnerability (HI 03-004; 03-010; 03-024).

Seasonality and instability of employment was highlighted as a vulnerability in terms of maintaining appropriate living standards. Income levels for general labourers was generally quite low: farming labourers (both male and female) typically received RP 20,000 per day (approx. \$2.10 USD), although the landowner would usually provide a lunch meal. Unskilled male construction labourers were generally paid RP 30,000 - 35,000 per day (approx. \$3.20 - \$3.75 USD), whereas a skilled male construction labourer may receive RP 40,000 - 45,000 per day

(approx. \$4.25 - \$4.80 USD) (HI 01-021; 01-024; 03-005). Although the wages are low, many households argued that they could cover education, health and daily living expenses if income and employment was stable and reliable (HI 01-021; 02-021; 02-025; 03-006; 03-019; 03-020; 03-024; 03-025; 05-011). One villager noted that “people with steady activity never have a problem to build the permanent house and the same time spend money for daily expenses” (HI 02-021). Thus, the seasonality and instability of income is a key vulnerability issue facing labourer households.

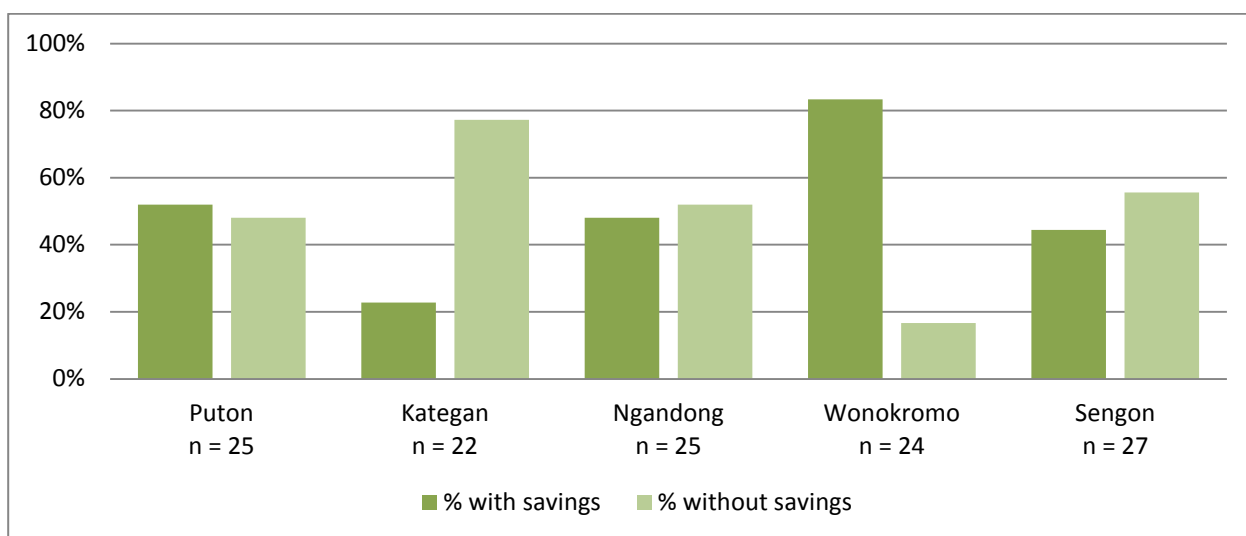
In order to reduce the vulnerability associated with unstable and unreliable income, a diversity of income sources is required. Particularly in Puton village, *Ibu X* has implemented a community development plan focused on increasing resilience through diversifying income sources. A number of villagers noted increases in household income due to the livelihood programming implemented in the post-disaster period, including fishing (*lele*) ponds, and tourism attractions (*watu welak*) (HI 01-005; 01-011). Particularly for women, these livelihood programs have provided a secondary source of income: “before the earthquake, the housewives were just sitting around waiting for money from their husband. Now they make money from making *keripik tempe* (fried fermented soybean cake) and other small home industry” (HI 01-006). In Kategan and Sengon, chicken, goat and cow breeding programs implemented after the earthquake have also contributed to diversification of household income sources (HI 02-002; 02-003; 05-005). These alternative employment strategies provide secondary income to help support households through periods of seasonal unemployment, leading to a more stable income and increased resilience. Besides the animal breeding programs, livelihood strategies to reduce the dependency on seasonal and unstable employment were not implemented in villages such as Kategan and Sengon.

6.4.2 Savings and credit programs

Level of savings has been identified as an indicator of vulnerability for hazards; therefore, households with liquid assets and cash are seen as having higher levels of resilience to face external shocks and stresses than are households without such reserves (DFID, 1999). Among the five villages, the research revealed that, generally, households with stable income sources were able to accumulate savings in cash and assets, such as jewelry and cattle. The impact of stable employment is evidenced in Figure 6.7, where the percentage of interviewed households with savings is compared to households without savings. From Figure 6.7, it is clear that Wonokromo (a village where stable employment is the norm) had the highest number of interviewed households with savings. On the other hand, Kategan (where seasonal or unstable employment is the norm)

had the lowest level of households with savings, with less than one quarter of households having cash or liquid assets. Puton, Ngandong, and Sengon (villages which fall between the employment extremes seen in Wonokromo and Kategan) had similar savings levels, with approximately half of all households having some degree of savings. This finding suggests a strong link between employment stability and savings available during times of crisis, and hence, vulnerability in the face of hazards and disasters.

Figure 6.7: Percentage of Households with Savings by Village



While level of savings has been identified as an indicator of vulnerability, evidence from the 2006 Yogyakarta recovery effort suggests a complex relationship between vulnerability and savings. A majority of households acknowledged selling assets (furniture, cows, goats, chickens) and savings (cash and jewelry) in order to support daily living expenses and rebuilding of housing after the earthquake. Many of these households had since been unable to re-accumulate any savings or assets, leaving them in a position of increased vulnerability to future shocks and stresses (HI 01-002; 01-003; 01-014; 01-025; 02-001; 02-002; 02-007; 02-014; 02-018; 02-020; 02-022; 02-025; 03-008; 03-020; 03-022; 04-013; 05-004; 05-016; 05-017; 05-020). Lack of savings and assets also limited the household's ability to cover household expenses such as healthcare and education: as noted previously, a small number of households were unable to pay tuition for their children following the earthquake as they used their savings for housing reconstruction (HI 01-015; 03-023). This increased the vulnerability of individuals and households in other forms of capital, particularly human capital. Accordingly, indicators of vulnerability that explore levels of savings should also examine the length of time that is required to replace lost or sold assets in order to

provide a more in-depth understanding of the vulnerability conditions of households. In this sense, a more accurate assessment would include a measure of how quickly lost assets can be replaced, as opposed to just current levels of savings.

Credit availability has also been highlighted as a factor influencing vulnerability and resilience (see Table 3.1). A number of interviewees acknowledged that access to credit facilities improved following the earthquake disaster (HI 02-009; 02-013; 04-008). Banks and other credit institutions provided low-interest credit programs to support the reconstruction of housing (HI 05-001). As well, credit programs were established following the earthquake to support the recovery of livelihoods and allow households to establish new entrepreneurial activities (HI 02-005; 02-023; 03-001; 04-008; 05-004; 05-016). Community organizations and cooperatives, particularly *Arisan*, also provided opportunities for savings and credit programs to support daily living expenses, entrepreneurial activities, as well as major expenses such as education, healthcare, weddings and funerals (HI 01-006; 01-008; 02-014; 02-024; 03-022; 05-008). Poorer households noted that they preferred to take credit from the community cooperatives due to lower risk and lower interest payments, as well as a relative lack of requirements for guarantee items compared to formal banking institutions (HI 01-006; 01-005; 01-011; 05-004; 05-006). For some households, these credit facilities have allowed for improved economic conditions due to the start-up of new entrepreneurial activities (01-008; 02-005; 02-023; 03-022).

An issue identified by villagers regarding micro-credit and financing institutions was regarding the lack of variety of livelihood options available. Several families indicated that they would like to improve their income by opening a *warung* - a small shop selling convenience food items (HI 01-005; 02-004; 02-013; 02-021; 03-002; 03-014; 03-017; 03-020; 03-021; 03-023; 04-003; 04-010; 05-008; 05-015; 05-016; 05-023; 05-025). While some households were able to generate a suitable income through these shop services, the rural and relatively isolated location of most villages suggests that the market for these goods is limited to nearby villagers. The easy access to micro-credit financing has allowed a number of families to open *warungs*, thereby increasing the competition for customers and diluting profit prospects. This has had the unintended consequence of reducing the income available for households who had *warungs* prior to the earthquake, as well as limiting the financial benefits of these types of new business opportunities (HI 01-005; 03-001; 04-023). Similar experiences were noted by other business owners, including one villager who worked as a rice grinding labourer: “before the earthquake my business as a rice grinder was a

good job with reliable income. But now I can't rely on the business anymore, because there are a lot of competitors. There are more competitors because when everyone gets success in their business then others follow the business" (HI 01-022). This issue is exacerbated by livelihood programming that targets one livelihood option in multiple villages, such as the sewing training program initiated by PNPM Mandiri. The resulting oversupply of tailoring labourers limited the profitability of these types of entrepreneurial activities.

6.4.3 *Financial capital and disaster recovery*

The recovery effort following the earthquake has had a significant impact on vulnerabilities and resiliencies related to livelihoods and aspects of financial capital. The reconstruction program provided an abundance of labour positions, although this period of high employment was relatively short-lived, and unemployment levels appear to be higher compared to the pre-disaster period, particularly for construction labourers in Bantul (HI 01-001; 01-021; 02-013; 02-022). Furthermore, one construction labourer noted that the reconstruction effort has contributed to increased unemployment as there is little need for new building projects, as the majority of buildings were rebuilt after the earthquake. Thus, there is little need for repairs or renovations (HI 05-004). Other research conducted in the region supports this finding: following the completion of the reconstruction effort, the unemployment rate in Bantul had doubled compared to pre-disaster levels (from 5% to 10%) (UGM & IRP, 2009). This suggests an overall increase in vulnerability, particularly for those individuals and households engaged in construction labourer positions.

In summary, the earthquake disaster and subsequent recovery has had the dual role of decreasing levels of savings and assets, yet increasing access to credit facilities. This is indicative of both increased vulnerability as well as increased resilience and has cascading effects for other levels of capital: education and healthcare costs have become prohibitive for some families and households have had to make greater use of social capital networks to fund the household recovery costs. Thus, the inter-relationships between the various capitals and vulnerabilities highlighted a cascading relationship, whereby increased vulnerability in one capital may increase vulnerability in other capitals.

6.5 *Natural Capital*

Natural capital explores the natural resource stocks that are available for livelihood opportunities, including resource services, intangible goods as well as divisible assets used for production

purposes (DFID, 1999). In the context of Bantul and Klaten, there are limited natural resources available for livelihood purposes and the majority of available land is used for low-intensity agricultural purposes (UGM & IRP, 2009). In the context of hazards, natural capital also includes geographical location and exposure to or protection from hazards, physical landscape features, and climate variability (see Table 3.1). The following discussion is organized according to these three themes, and a summary of the vulnerability and resilience issues associated with natural capital is highlighted in Table 6.5.

Table 6.5: Summary of Natural Capitals

Village	Vulnerabilities	Resiliencies
Puton	Climate variability impacts farming and transportation; Proximity to Merapi volcano and Opak River	Productive and fertile agricultural lands; Access to rivers for fishing/irrigation services
Kategan	Climate variability impacts farming, health and working conditions for labourers	Productive and fertile agricultural lands; Access to river for fishing
Wonokromo	Very little access to agricultural lands surrounding village; Climate variability impacts employment and health Village located at the junction of three river systems, increasing flooding risk	Geographic location of village leads to high accessibility; Improved land title registration; Access to rivers for fishing
Ngandong	Ongoing issues with flooding of rice paddies reduces crop yields; Prolonged wet season has contributed to pest infestations that reduce crop yields; Pest infestations leads to increased use of fertilizers and poor quality crops that have sickened cattle; Village location reduces accessibility	Some productive and fertile agricultural lands; Access to river for fishing/irrigation services; Access to forested areas for timber and non-timber forest products;
Sengon	Ongoing issues with bug infestations has severely reduced crop yields, leading to unemployment and lack of food; Climate variability impacts farming and health conditions; Remote village location reduces accessibility and employment networks	Productive and fertile agricultural lands (although crop yields limited due to infestations); Access to forested areas for firewood and forest products

6.5.1 Exposure to hazards

As noted in section 5.3, each of the five villages is exposed to a variety of hazards, including earthquakes, flooding, landslides, and strong wind storms. The recent 2010 Mt. Merapi eruption highlighted the complex interaction between hazards and livelihood opportunities: while there is low risk associated with the immediate dangers of eruptive events, the dispersion of ash through the atmosphere and hydrological system creates both a risk of flooding as well as fertile agricultural soil. This was highlighted in Puton where sediment-filled rivers contributed to two

flooding events in one year, damaging fish breeding ponds and agricultural fields, and highlighting ongoing vulnerabilities associated with hazard exposure (CM-01). Conversely, eruptive events also contribute to rich and fertile agricultural lands in volcanic regions. In both Bantul and Klaten, rich and productive agricultural lands contribute to livelihoods opportunities for farming, as well as a year-round food source, enhancing overall resilience.

While Ngandong and Sengon should have productive agricultural land, issues associated with flooding and bug infestations have led to significant issues with productivity and low crop yields (HI 03-001; 03-004; 05-001). In Sengon, the impacts of the bug infestation have been severe, with low skill levels, high unemployment and low standards of living exacerbated by low crop yields (HI 05-001; 05-011; 05-028). Households have had to begin purchasing food, whereas they previously harvested it themselves (HI 05-013; 05-014; 05-017). The impacts of the infestation were highlighted by one villager who noted that in a normal harvest, one *patok* of land (2200m²) would yield 300 - 400kg of rice, but the most recent harvest yielded only 25kg (HI 05-014). As the agricultural land typically produces three harvests per year, this represents a substantial loss for households in terms of income and food source, contributing to overall vulnerability. Several reasons were identified for the bug infestation, including:

- 1) Different planting times and regulations among landlords: this results in a rotating cultivation scheme that allows the *wereng hijau* (green leafhopper) to flourish;
- 2) Unpredictable weather and lack of a dry season: typically, during the dry season, the bugs die off, reducing the number of pests during the subsequent wet season. Due to climate variability and the lack of a dry season, humidity levels and increased discharge levels have overrun the irrigation systems, leading to standing water and prime conditions for the bugs to flourish;
- 3) Lack of predators: Ongoing hunting of birds has reduced natural mechanisms for controlling pest infestation levels (HI 05-001; 05-004; 05-007).

The bug infestation has also impacted animal husbandry and livestock activities. Villagers noted that the increased use of pesticides to control the pest population has tainted the straw and grasses used to feed livestock and poisoned the animals (HI 03-010; 03-012; 05-016). Secondary businesses associated with agricultural activities have also been impacted as one villager who rents a tractor to farming labourers noted decreases in activity and income (HI 03-011). Farming labourers have also been significantly impacted as farmers and landlords are not employing labourers to harvest the fields (HI 03-019; 03-025; 05-004; 05-015). Income levels and standards

of living in the village have dropped significantly, with an increase in the number of families receiving RASKIN (*Beras untuk Rumah Tangga Miskin* - Rice for Poor Families) (HI 03-011). This further highlights the cascading effects that vulnerabilities in one capital can have on other forms of capital.

6.5.2 Geographic Location

The geographic location of individual villages also contributed to levels of vulnerability and resilience in the post-disaster period. In terms of the physical landscape and geographic location, Wonokromo village lacks agricultural lands due to its urbanized form (HI 04-004; 04-012), although the close proximity to Yogyakarta city and location immediately adjacent to a main road contributes to ease of accessibility (HI 04-008). This had a positive impact on resilience in the immediate aftermath of the earthquake as numerous donations arrived in the village from strangers and donors from Yogyakarta city (HI 04-025). In Kategan and Puton, villages are located farther from Yogyakarta city, although still along main routes and have good accessibility to the southern parts of the city. On the other hand, both Ngandong and Sengon are geographically isolated, located far from main roads and in the southern part of Klaten near the mountains (HI 03-002; 05-012). In these instances, access to markets for certain types of entrepreneurial activities is limited (HI 03-002; 05-012). The geographic location of Ngandong and Sengon also contributed to lower amounts of aid received in the aftermath of the earthquake: geographic isolation and aid organizations focusing on Yogyakarta province decreased the focus on providing assistance to these villages (CM-03). Thus, the geographic location of two of the villages contributed to increased vulnerability, whereas the remaining three villages experienced higher resilience due to easier accessibility.

6.5.3 Climate variability

The impacts of climate variability and possibly global environmental change have had significant impacts on households in all five villages, particularly landowners, farmers, and farming labourers. Climate change projections for the region indicate expected changes in seasonality of wet and dry seasons, delays in annual monsoon periods, and shifts in precipitation patterns (Case, Ardiansyah, & Spector, 2008). Evidence has suggested that climate change has already occurred over the past three decades throughout Indonesia, with a trend towards increasing precipitation levels. While these precipitation levels are increasing, the trend suggests a pattern of increased rainfall during

wet seasons, and a more prolonged dry season with reduced rainfall, which may contribute to increased vulnerability due to climate extremes (Oktaviani, Amaliah, Ringler, Rosegrant, & Sulser, 2011).

These climate shifts have had an impact on agricultural activities in the villages of Puton, Kategan, Ngandong and Sengon. In previous years, farmers were able to accurately calculate the start and end of the dry season, thereby allowing the planting of appropriate crops (HI 01-019; 02-004; 03-022). On average, agriculturalists can generate three harvests per year: two of these harvests are rice and occur during the rainy season, whereas the third crop cycle is *palawija*, referring to dry season crops such as corn, legumes, and cassava (HI 02-023; 05-004). A majority of farmers noted that they are now unable to predict the wet and dry season due to seasonal variability and shifts in precipitation trends (HI 01-001; 01-003; 01-012; 01-015; 02-004; 02-010; 02-014; 02-015; 03-001; 03-015; 03-022; 05-002; 05-005; 05-012; 05-017; 05-024). Errors in planting timing and crop type can have significant impacts on the vulnerability of farming households, as rice quality and crop yields decrease, negatively impacting food stocks and income levels (HI 02-017; 02-018; 03-021; 05-004). The impact of a lack of dry season in Ngandong and Sengon have already been noted above, as pest infestations have severely reduced crop yields.

Shifts in seasonal precipitation can also impact other sectors, particularly the construction sector. During the wet season, increased precipitation levels causes difficulty for travelling to Yogyakarta city for employment²⁴ (HI 01-005), as well as working outdoors in construction during heavy downpours (HI 04-019). During the dry season, hotter days make it difficult for construction labourers to work as the heat becomes unbearable (HI 02-009; 02-011; 04-005). On the other hand, two entrepreneurs noted the positive impacts of these climate shifts, as ice sellers will have increased business due to the heat (HI 04-025), as well as increased sales of propane gas instead of firewood during the rainy season (HI 01-006). This suggests issues related to environmental change may contribute to both vulnerability and resilience, depending on the livelihood strategies engaged in.

²⁴ Note that the majority of households are using motorbikes as the main method of transportation which causes difficulty when traveling during rainy periods, particularly heavy downpours. The majority of motorbikes will pull off the road during a rainfall event for safety reasons, thereby limiting transportation during these periods of heavy precipitation.

6.5.4 *Natural capital and disaster recovery*

The recovery effort after the 2006 Yogyakarta earthquake tangentially impacted natural capital resources through the livelihood programming, particularly through the establishment of farming organizations, provision of support for new or rehabilitated irrigation systems, as well as some improvements on the diversity of livelihood options. This supports a move away from seasonally-dependent income, towards a diversified livelihood portfolio at the household level, thereby improving resiliencies. These initiatives have been successful for some households, particularly those involved in the farming organizations in Kategan.

In Ngandong and Sengon, vulnerability levels have been perpetuated, or even increased in the post-disaster period due to on-going struggles with agricultural productivity. While it is beyond the realm of the recovery effort to impact climate variability and global environmental change, livelihood and capacity building programs should help households to develop adaptive strategies and skills for improving their livelihood opportunities in the face of these issues. These strategies could include upgrading irrigation systems, farming cooperatives (as noted above), crop diversification strategies, secondary income through animal husbandry and value-adding industries (i.e. food and/or production). The ongoing struggles facing many households in Ngandong and Sengon suggest that the recovery effort did not effectively contribute to increased natural capital access: capacity to adapt and respond the various hazards remains low, household vulnerability levels continue to increase due to ongoing exposure to shocks and stresses, and economic conditions for many households, particularly in Sengon, have decreased significantly.

6.6 Political Capital

As noted in Chapter 2, political capital examines the “ability to influence policy and the processes of government...[and] is important in determining the ability of households and individuals to claim rights to assistance after a disaster” (FAO & ILO, 2009, p. 11). Aspects of political capital include the strength of local leadership and decision making structures, accountability of governance institutions, and issues of corruption, and are discussed in the following sections. Table 6.6 outlines the various vulnerabilities and resiliencies associated with political capital for each village.

Table 6.6: Summary of Political Capitals

Village	Vulnerabilities	Resiliencies
Puton	Conflict with <i>desa</i> level government leads to lack of funding; Village leader killed during earthquake; Some villagers uncomfortable to critique government structures	Freedom to discuss issues with community leaders (<i>musyawarah</i>); Close relationship with ex- <i>Bupati</i> ; Strong local leadership
Kategan	Loss of <i>dukuh</i> before earthquake contributed to lack of leadership during response and recovery phases; Low levels of participation in political aspects; Reliance on <i>desa</i> leader for solving village issues	<i>Desa</i> level leader is from village and provides strong leadership; <i>Desa</i> leader is part of aristocracy; Strong youth organization
Wonokromo	Multiple religious and government leaders leads to social and political fragmentation and lack of cooperation and support for government programs; Unequal distribution of secondary housing and social programming	Freedom to discuss issues with community leaders (<i>musyawarah</i>); Strong government and religious leaders provide psychological support for recovery; Empowered to discuss political issues at multiple government levels
Ngandong	Some issues of unfair distribution of aid after earthquake; Some villagers are uncomfortable critiquing the local government	Transparent and coordinated <i>desa</i> government with strong support from community; Awareness of central government policy; Freedom to discuss and critique local and central government policy
Sengon	Lack of leadership during earthquake response due to recent retirement of <i>lurah</i> ; Higher levels of aid corruption compared to other villages; Incapacity of government to respond to farming and employment issues	Fair distribution of government rice program (<i>raskin</i>) for poor families; Freedom to discuss and critique local and central government policy

6.6.1 Strength of local leadership

In Puton, Kategan and Sengon, there were issues associated with lack of a village leader following the earthquake, due to death and retirement. Each of these villages had a different experience with the political vacuum in the immediate aftermath of the disaster, highlighting the importance of contextualizing vulnerability and resilience. In Puton, the village *dukuh* was killed during the earthquake, leading community volunteer *Ibu X* to take over leadership duties in the village. While this could have led to increased community vulnerability, the strength of her leadership contributed to significant improvements in the coordination and facilitation of aid and recovery programming in Puton village, as outlined in section 5.3.1, indicating strong resilience. This also contributed to growing levels of respect from villagers, allowing *Ibu X* to push forth a progressive development program focusing on a diversity of sustainable livelihood strategies. One villager noted: “I pride *Ibu X* and without her this village would still be a backwards civilization. But sometimes the villagers cannot follow the program because it is very progressive and developed - the program is

very good but rapid and maybe a bit different than the villager's conditions" (HI 01-010). Households may not always understand or see the necessity of the development programming, although they will follow the program based on their respect for *Ibu X*. One villager noted that if *Ibu X* asked him to do something, there were only two responses that he could give: "yes and yes" (HI 01-021). Similarly, in Ngandong village, the *lurah* was highly respected for his role in struggling to obtain funding for his village as well as his efforts to contribute to transparency and fair distribution of the post-earthquake assistance (HI 03-002; 03-004; 03-005; 03-007; 03-014; 03-016; 03-021). In both these cases, community leadership has contributed to a strengthening in the capacity of local government systems to push forth development programs, which have had positive results for resilience levels and increasing overall welfare in each village.

In Kategan village, the *dukuh* passed away shortly before the earthquake, leading to a lack of leadership and increased vulnerability during the post-disaster period (HI 02-004). Fortunately, the youth group in the village took control of organizing and distributing aid, as well as trying to acquire further assistance by situating a stall for collecting aid on *Jalan Parangtritis*, one of the main roads in the southern part of Yogyakarta city (HI 02-007). Despite a new *dukuh* being elected approximately two years after the earthquake, there has been limited new programming or attempts to attract new funding. During the focus group discussions, the Kategan community leaders cited their limited knowledge in terms of what type of programs to implement as well as how to obtain funding for development initiatives (FG-02). One of the positive aspects of political leadership, and hence, political capital resilience, in Kategan was the *lurah*, who is from the village and was considered capable and wise in solving village issues (HI 02-005; 02-007). While the *lurah* provided a source of strong leadership for the village, his primary residence was in Yogyakarta city and he was responsible for a number of other villages, limiting his ability to effectively contribute to improving conditions in Kategan.

In Sengon village, the retirement of the *lurah* shortly before the earthquake contributed to a leadership void and thus political capital vulnerability during the disaster recovery period. Although villagers attempted to organize and distribute aid using existing community structures, interviewees reported significant issues with corruption (HI 05-002; 05-010). Although a new *lurah* was elected, there were concerns regarding the ability of the *desa* government to contribute to post-disaster solutions for reducing poverty and unemployment, as well as offering programming to improve the productivity of agricultural lands (HI 05-006; 05-012; 05-013; 05-

016; 05-019). Although there were concerns regarding the ability of the local government to initiate and implement livelihood and adaptation programs, the capacity of the local government to implement current programming was complimented. Certain RT leaders were commended for their fair distribution of aid in their neighbourhoods, as well as the distribution of the *RASKIN* rice program (HI 05-014; 05-017; 05-018; 05-019; 05-026; 05-027).

In Wonokromo village, although there were a number of strong leaders, and therefore potentially strong political capital resiliencies, this diverse leadership has contributed to conflict within the community. In particular, there were issues between the *dukuh* and other leaders who ran in the leadership election (as outlined in section 5.3.3) as well as the strong religious leadership in the village. One villager noted:

The big problem in this sub-village is the community leaders, the non-government ones, who do not support programs that is made by the local government and *Pak Duku*. The community leader seems to ignore the government programs. They just concern about religion problems not in environment, or livelihood problems. (HI 04-004).

Due to these conflicts, there have been difficulties implementing new programs within the village, and there are portions of the population who do not support government-run programming (HI 04-001; 04-011; 04-012). While some villagers may not support the current *dukuh*, there were other households who commented on the good organization and fair distribution of disaster aid, efforts by the local government to maintain communication and transparency with the villagers, and the implementation of environmental and hazard mitigation initiatives (HI 04-006; 04-007; 04-011). The difficulty faced in trying to implement fair programming in the divisive village is indicated by one villager who commented:

There was a problem after the earthquake because *Pak Duku* distributed aid to people who didn't support him, and people who support him are upset because they feel those people didn't support the *dukuh* so why should they get assistance (HI 04-006).

Despite the presence of conflict, in Wonokromo, the strength of government and religious leaders provided strong support for community members following the earthquake disaster. The community leaders came together shortly after the earthquake to organize and launch shelter and food relief (HI 04-011). In particular, the religious leaders provided spiritual support to encourage villagers to rise up and recover from the disaster (HI 04-005; 04-006; 04-011). This suggests that

political leadership in Wonokromo contributed to both vulnerability and resilience (to be discussed further in the cultural capital section).

To summarize, Puton and Ngandong exhibited strong, collective leadership, with local governments working together towards implementing livelihood programming to increase resilience through stability of income and improve living conditions in the village. While Wonokromo also had strong leaders, competition and conflicts between different factions in the village reduced the strength of individual leaders and increased the difficulty of implementing progressive and adaptive programming. The strength of leadership in the three aforementioned villages is highlighted by their refusal of assistance from some organizations due to perceived inappropriateness of the assistance (e.g. temporary shelters which were not needed, attempted provision of a small number of houses which would have resulted in conflicts, and assistance tied to religious demands) (CM-01; CM-03; HI 04-008). While Sengon and Kategan both had local governments capable of implementing programming, there was a lack of initiative and knowledge base to instigate adaptive and livelihood programming in the post-disaster period, contributing to political capital vulnerabilities. Furthermore, the strength of regional and provincial governments, particularly in Yogyakarta province was highlighted (E-02). In Yogyakarta, the sultanate provides an additional source of political leadership, with faith in this monarchical governance structure providing support and faith for recovery (E-14).

6.6.2 Decision-making structures

Decision-making structures in many parts of Indonesia tend to reflect Javanese culture and traditions, particularly the collective spirit of rural village life. The concept of *musyawarah-mufakat* represents:

An important manifestation of the *gotong-royong* ethos in most Indonesian village communities...the concept involves the processes that develop general agreement and consensus in village assemblies, which emerge as the unanimous decision or *mufakat*. This unanimous decision can be reached by a process in which the majority and minorities approach each other by making the necessary readjustments in their respective viewpoints, or by an integration of the contrasting standpoints into a new conceptual synthesis (Jaraninggrat, 1967, p. 397).

Accordingly, villagers meet together to discuss issues and develop solutions through consensus building and mutual agreement. The majority of discussion takes place “behind the scenes” as

opposed to during village meetings in order to avoid conflict and controversy in public. Thus, official village meetings where votes take place tend to be more ceremonial in nature, as opposed to a discussion and decision-making arena (Kawamura, 2011, p. 5). Several villagers commented on *musyawarah* as a positive component of decision-making processes in their respective villages and noted impacts on social harmony and reduced conflict, suggesting a form of resilience (HI 01-001; 01-011; 01-021; 03-005; 03-007; 04-006; 04-025).

In principle, the concept of *musyawarah-mufakat* offers an opportunity for all voices to be represented in decision-making structures, although this cultural tradition may contribute to limited expression of opposing opinions in the public sphere. This is particularly evident for poorer, more marginalized individuals who expressed a reluctance to discuss government issues or critique policy and programming. Many of the poorer and/or uneducated villagers felt that they had no right to comment and critique government policy (HI 01-009; 01-016; 02-002; 02-009; 02-010; 02-014; 02-015; 02-020; 03-008; 04-010; 05-007; 05-008; 05-016; 05-017). Samples of villager comments highlight issues of political capital vulnerability, including:

“I’m nothing more than an ordinary person and I don’t have the right to judge or comment on the government” (HI 02-002);

“It’s not my business to complain about the government since I’m an uneducated person” (HI 02-014);

“I have no right to comment on government policy because I’m a nobody in this village” (HI 05-017).

While these types of comments were consistent from poorer households in Puton, Kategan and Sengon, villagers in Wonokromo and Ngandong expressed a higher degree of interest in government activities at all levels (local, regional, and national) and were more open to critiquing government policy (HI 03-001; 03-003; 03-016; 03-017; 03-022; 04-001; 04-005; 04-021; 04-024; 04-025). Particularly in Ngandong, villagers expressed disappointment in Central government policy that they believed impacted local economic conditions, mainly focusing on importation policies of agricultural commodities that reduced rice and beef prices for local farmers (HI 03-001; 03-003; 03-022). Although these villagers expressed opinions on government policy, many felt a lack of empowerment to influence government decision-making processes at levels outside the village, indicating ongoing vulnerability.

6.6.3 *Accountability of government institutions*

Since the period of democratization beginning in 1998, there have been increases in government accountability compared to the Suharto regime. Efforts at curbing government corruption through the Corruption Eradication Commission (KPK) have resulted in increased attention and awareness of political and economic bribery, although local-level corruption appears to have increased as a result of processes of decentralization (see section 4.1.1) (Fanany, 2003; Kimura, 2011; Rondonuwu, 2009). While these increases in transparency represent a positive change for the Indonesian political system, there are a number of areas where the accountability of government institutions remains elusive, and this theme was probed in the research.

The length of terms for government positions varies according to the type of leadership position, and this may contribute to political capital vulnerability. At the local government level, the term of an elected *lurah* lasts for eight years, whereas the *dukuh* is elected until retirement at age 60 (CM-01). During the course of elected terms, there is little recourse for individuals and communities who may take issue with the administering of funding or programming, increasing vulnerability and reducing accountability of governance structures. In Puton village, conflict with the *lurah* has resulted in a complete loss of government funding for village programs. Village leaders commented that there was nothing that could be done except to wait two more years until the *lurah's* term was finished (CM-01; HI 01-024). At the individual level, in Wonokromo, some residents recounted stories that demonstrated the lack of accountability structures that exist for complaints and appeals. One such story is highlighted in Box 1.

Regarding central government policy, villagers reported general feelings of lack of empowerment and little control over decision-making structures, as discussed in section 6.6.2. As noted above, many of the poorer villagers felt they were not in a position to be able to critique government policy, either because they were poor or uneducated (HI 01-009; 01-016; 02-002; 02-009; 02-010; 02-014; 02-015; 02-020; 03-008; 03-011; 04-010; 05-007; 05-008; 05-017). This perception may be traced back to Indonesia's history of dictatorship and an educational system that was designed to imbue the message "that society should be a passive recipient of government wisdom" (Vickers, 2005, p. 189). Where villagers were keen to critique government decisions and policies, they also felt a lack of political power to influence these decision-making structures. One villager noted:

I'm a bit disappointed sometimes with the Central Government policy because it makes it harder for the people here. For me, I have access to send a letter to the

senate but the senators don't care about the people below them so what can I do? Poor people can only feel mad but can't do anything - they can complain but not do anything. They vote for people who say they will change things for the poor people but when they get into power they don't do it - it's just empty promises (HI 03-001).

This feeling of political disempowerment suggests ongoing vulnerability and was prevalent throughout four of five research the villages: Puton, Kategan, Ngandong and Sengon. On the other hand, villagers in Wonokromo appeared to have a greater sense of empowerment, with individuals' questioning decisions and following-up at government offices, as evidenced by *Pak X's* story in Box 1. When individuals in other villages were questioned about decisions they did not agree with (i.e. distribution of aid, participation in programming, JAMKESMAS etc.), almost none had followed up with government officials, and did not make any attempts to rectify government decisions (HI 01-007; 02-002; 02-009; 02-014; 02-020; 03-020; 05-003; 05-025). Thus, issues of political empowerment and political capitals levels varied across the villages, resulting in varying levels of vulnerability and resilience.

Box 1: A Tailor's Story

Pak X, a tailor, did not receive assistance after the earthquake from the Social Ministry's PNPM sewing program. After he went to discuss the issue with the village *dukuh*, he was informed that his name had been included on the list of villagers who should receive a sewing machine. The list of names was then passed on to the *desa* government, who submitted a final list of names to the Social Ministry. When *Pak X* went to the *lurah's* office to discuss why he had been excluded from the program, the office did not provide an explanation or make any changes. *Pak X* then went directly to the Social Ministry office to see if anything could be done, although he was informed that the office does not take any personal requests for assistance and that they distribute assistance based solely on the list provided by the local level government (HI 04-009). Another tailor in the same village complained about the selection of villagers who received assistance from the sewing program, indicating that many of those who received the sewing machines were not tailors and eventually sold their machines (HI 04-010; 04-009). This story is indicative of the power of local government institutions to impact how funding and assistance is distributed, and how little recourse is provided to individuals and villagers who disagree (E-15).

6.6.4 Corruption

Concurrent with a lack of accountability of government institutions, the research revealed that vulnerability related to corruption of government funding sources was an ongoing issue for

Indonesian political structures. During the post-disaster period, villagers in Sengon and Wonokromo indicated there were specific examples of individuals' illegally diverting relief and recovery aid (HI 04-005; 04-013; 05-012; CM-04). On a positive note, instances of corruption in Sengon and Bantul (not one of the study villages) have been investigated and court proceedings have been brought against particular individuals (HI 04-004; 05-012; CM-04). Villagers in Klaten particularly highlighted the Regency and Provincial government misappropriating funding (CM-03; HI-03-001). In Klaten, as funding is administered from the Central government down through to the local village level, approximately 10 - 20% of funding is siphoned off at the provincial and regency level, generally termed an administration fee (HI 05-002; CM-03). As noted in section 5.3.4, the *lurah* in Ngandong has been particularly forceful in obtaining the full amount of funding for his village, demonstrating his resilience and capacity to act as a leader and intermediary to fight ongoing issues of corruption.

While the research revealed significant and ongoing issues with corruption, at times, it was difficult to determine whether corruption had actually occurred or whether individuals were unaware of distribution procedures, unaware of the actual amount of aid that they should receive, or simply felt that they did not receive enough assistance (HI 01-005; 01-012; 01-022; 02-015; 02-023; 03-020). In a few instances, households received larger personal donations from friends and family members outside their village, which may have given surrounding households the impression that these beneficiaries corrupted assistance (HI 01-017; 01-022; 04-005; 04-007).

While corruption represents an ongoing issue in Indonesia, attitudes towards corruption reflect the difficulty in eradicating fraudulent behavior. In one village a local leader commented on observed corruption:

There is a group of people who are deviant with the assistance. People in the government took the assistance for their own needs for themselves. I was against that and took my village portion and distributed it. I never told this problem to the higher government people because I don't care. If people want to do something wrong that is their choice but I will just do it my way (HI 05-002).

This viewpoint was consistent among other villagers who were in high-level roles during the recovery period and observed corruption:

The leaders of the group of people who were organizing the assistance for housing and distributing the 15 million - sometimes they had deviant actions. He was taking some of the money and not giving the full 15 million but a small

administration fee. It's not necessarily bad because we don't care - if they want to be corrupt then be corrupt - but there will be social punishment. We don't associate with that person anymore (HI 04-005).

While these comments indicate that corruption may lead to some form of social punishment, in general, a laissez-faire attitude towards misappropriation of funds allowed corruption to continue unchecked in many instances. These attitudes towards corruption may be a reflection of the perception that there is a lack of accountability in the government system, as well as cultural values that encourage saving face and avoiding conflict (to be discussed in section 6.7.3).

6.6.5 Political capital and disaster recovery

Access to political capital in the form of strong leadership significantly impacted vulnerability and resilience levels as well as recovery and assistance received during the post-disaster period. Strong leadership in Puton and Ngandong during the recovery contributed to feelings of respect and support for local government institutions. This allowed leaders to implement new programming to increase the living standards of households in their villages during the post-disaster period. On the other hand, the recovery period in the remaining three villages highlighted current tensions and issues, including social conflict and lack of accountability of government institutions. In all villages, the recovery effort helped to build the capacity of local government institutions and community organizations to respond to disasters and contributed to learning on implementing large scale programs and knowledge on hazard mitigation measures. In this way, the recovery program potentially contributed to increased political capital resiliencies through the implementation of a community- and government-driven response.

The recovery program, particularly from the humanitarian sector, also focused on issues of transparency and accountability. Public postings of aid funding and the objectives of the programming were visible in all case study villages during the research period. Monitoring of aid distribution and using local neighbourhood groups to distribute housing reconstruction funding also supported a transparent and accountable recovery program. Community-based distribution organizations were used to limit corruption as it was thought that responsible individuals would be less likely to divert assistance from neighbours, family and friends. This type of approach may have reduced vulnerability issues related to corruption, particularly in those villages with strong communal spirit, such as Katagan.

With the exception of local leadership, which was strengthened in two villages, overall, there appeared to be limited impacts and positive changes on political structures and political vulnerabilities and resiliencies during the recovery period. Access to political power and accountability of government structures has remained consistent in the pre- and post-disaster period. As well, issues of political empowerment and access to political power remained relatively unchanged following the disaster.

6.7 Cultural Capital

Cultural capital involves the set of attitudes, practices and beliefs that underpin the functioning of different societies and includes aspects such as shared histories, heritage, values, knowledge, traditions, rituals and ideologies (Daskon, 2010; Throsby, 1999). Within the context of Yogyakarta and Central Java provinces, there are cultural features that both inhibit and enhance disaster preparedness vulnerabilities and resiliencies. These include strong religious faith, spirit of community togetherness and cooperation, and cultural values and attitudes. Table 6.7 provides an overview of the various vulnerabilities and resiliencies which are thought to be associated with cultural capital in each village, followed by a discussion focusing on the three themes mentioned above.

Table 6.7: Summary of Cultural Capitals

Village	Vulnerabilities	Resiliencies
Puton	Religious fatalism leads to lack of preparedness initiatives	Strong religious faith provides support for recovery; Spirit of <i>gotong royong</i> supports recovery and community development; Javanese philosophy of <i>nrimo</i> - accepting of circumstances and give thanks to God; Javanese cultural traditions promote familial support
Kategan	Religious fatalism leads to lack of preparedness initiatives; Adherence to construction timelines reduced the use of <i>gotong royong</i> for permanent housing construction	Increased spirit of <i>gotong royong</i> supports recovery and community development; Religious faith provides hope and support for recovery; Javanese cultural traditions promote familial support
Wonokromo	Low use of <i>gotong royong</i> during the reconstruction period	Strong religious organizations and activities provides strength and support for recovery and everyday living conditions as well as external linkages; Javanese cultural traditions promote strong familial support; Religious beliefs used to support strong recovery and improvements in living conditions in the post-disaster period
Ngandong	Religious fatalism leads to lack of preparedness initiatives	Religious faith provides hope and support for recovery; Javanese cultural traditions promote familial support;

		Spirit of <i>gotong royong</i> supports recovery and community development
Sengon	Strict adherence to construction timelines reduce the use of <i>gotong royong</i> for permanent housing construction; Religious fatalism leads to lack of preparedness initiatives	Religious faith provides hope and support for recovery; Javanese cultural traditions promote familial support; Strong spirit of <i>gotong royong</i> supports recovery and community development

6.7.1 Religious faith

The strength of religious faith in all villages contributed to both vulnerability and resilience. The dominant faith in all five study villages, Javanese Islam, led to a tendency for villagers to assume a fatalistic attitude towards hazards and disasters. Several villagers expressed the opinion that disasters were acts of God and that there was no way to resist them (HI 01-002; 01-010; 02-001; 02-009; 03-010; 03-017; 05-025; 05-027; 05-028). One villager noted: “just let it flow because what God wants, it will happen” (HI 01-001). Many villagers also commented that disasters were a destiny from God, which have already been written in the *Lauful Mahfudz* - the Book of Destiny (HI 02-003; 02-006; 02-012; 02-014; 02-017; 02-018; 03-004; 03-008; 03-011; 03-012; 03-013; 03-016; 03-017; 03-019; 03-023; 03-025; 04-004; 04-006; 04-008; 05-005; 05-017; 05-018). Due to this belief in disasters as God’s destiny, some villagers expressed the conviction that there is nothing that can or should be done to prepare for disasters (HI 01-010; 02-001; 02-009; 02-010; 05-005). Others believed that the best method for preparing for disasters was to pray, maintain closer relationships with God, and/or just accept God’s will (HI 02-005; 02-018; 03-013; 03-014; 03-016; 03-023; 04-011; 04-012; 04-022; 05-011; 05-017; 05-027; 05-028). Fatalistic attitudes were particularly evident through one villager who noted:

There is nothing that should be done to prepare for disasters. We give all things on earth to God. Everything on earth will go back to God so we just prepare mentally. The disaster comes from God and written in the Book of Destiny so you just have to accept it and try to survive it (HI 05-005).

Thus, these religious beliefs lead villagers to assume that there is little to be done to mitigate against various types of hazards and little to be gained from engaging in preparedness activities, suggesting an increase in vulnerability.

Conversely, religious faith also provided a strong resilience and support mechanism for recovery following the earthquake. Over 30 of the 128 interviewed villagers mentioned their religious faith

as a source of strength during the post-disaster period: this was the second only to the role of family as a support mechanism. Villagers' belief in God's role in their destiny allowed them to accept the destruction and loss, and move on to a new phase in their life (HI 02-002; 02-003; 02-005; 03-022; 05-005; 05-018; 05-026; 05-027; 05-028). Support from religious leaders through sermons and discussions also provided the strength and support that some villagers needed to begin the recovery process (HI 01-004; 04-005). One villager commented:

Each person has their own destiny and I accept mine and will try to rise up again. Why do we fall? Because God orders us to leap up! (HI 03-003)

Particularly in Wonokromo, the village with the highest level of religious activities and a number of strong religious leaders, interviewees highlighted the role of religion during the recovery period. While villagers sustained their belief that disasters are a destiny from God, there were limited comments associated with religious fatalism: instead, villagers used their faith not only to support resilient recovery and rise up from the disaster, but also to improve their conditions and behavior. A sample of comments from Wonokromo includes:

Earthquake is God's destiny - it's a cycle and notice for humankind to come back to God's instruction and realize that God has higher power to rule the universe (HI 04-011)

The earthquake is God's notification for us to get closer to him. He tries to remind us that doing sins should not be done by humankind, especially now when humankind kills in the name of God (HI 04-012)

This is the second chance God gave me to patch up my life quality (HI 04-024)

The earthquake taught me to reconsider the role of God in this life. Natural disasters is something to learn to avoid: humans should live in balance and harmony with the environment they live in so that they can easily adapt and adjust the way they live (HI 04-021)

These examples demonstrate how strong religious faith contributed to resilience through changing philosophies regarding improving quality of life and reducing the likelihood of future disasters. The difference in attitude generated by religious faith may be a result of the strength of religious leadership who promote faith as a means for personal strength. Thus, strong religious faith does not necessarily lead to vulnerability through fatalistic beliefs, but depends on the individual and, most likely, religious leadership in the community.

6.7.2 *Spirit of community togetherness*

High levels of resilience were seen in most villages through the use of the cultural spirit of *gotong royong* (GR) to clear debris, and to build temporary and permanent shelters. In Puton, Kategan and Sengon, GR was used by most villagers to clear debris and build temporary bamboo housing, although many households paid labourers to rebuild their permanent houses (HI 01-011; 01-012; 01-013; 02-017; 02-019; 02-022; 05-002; 05-005; 05-007; 05-010; 05-012; 05-023; 05-024). Reasons for hiring labourers included wanting to complete the reconstruction of their houses faster, and attempting to meet the strict government deadlines for completing each reconstruction phase (HI 05-006; 05-026). On the other hand, those who used GR to rebuild their permanent houses generally cited a lack of funds to be able to afford paying labourers, instead taking longer to build their houses and using their own family members as labourers (HI 01-013; 02-020; 02-023; 05-022; 05-025). In Wonokromo, *gotong royong* was only used to clean debris as the majority of villagers did not accept temporary bamboo housing and almost all interviewed households hired labourers to reconstruct their permanent houses (HI 04-003; 04-004; 04-007; 04-009; 04-011; 04-014; 04-015; 04-017; 04-018; 04-019; 04-021; 04-023; 04-024; 04-025). Lack of available labourers and low construction skills among villagers in Wonokromo also contributed to the need to hire labourers, thereby increasing the overall cost of housing reconstruction by approximately 20% (HI 01-011; 04-005; 04-025). Similar to Puton, Kategan, and Sengon, villagers in Wonokromo also cited the strict government deadlines for each reconstruction phase, as well as a desire to reconstruct their homes as quickly as possible, as reasons for hiring labourers as opposed to using GR (HI 04-005; 04-025). In Ngandong, there was greater use of *gotong royong* to rebuild permanent housing, thereby eliminating labour costs for rebuilding. As the funding provided for housing reconstruction was considered low by almost all interviewees, the use of GR allowed the entire amount to be spent on building materials as opposed to also having to pay labour costs (HI 03-001; 03-007; 03-009; 03-010; 03-011; 03-023).

Villagers also identified the community spirit of togetherness as an important aspect of resilience through providing strength and motivation to recover after the disaster (HI 01-021; 01-022; 02-007; 02-025; 03-002; 03-004; 03-008; 04-005; 04-006; 05-004; 05-013). One villager noted that after the earthquake:

Everything in the community was together and the feeling of togetherness in the spirit of *gotong royong*. Together we talk to each other and encourage each other (HI 01-021).

Another villager highlighted the importance of *gotong royong* to support earthquake recovery:

Gotong royong is better after the earthquake because based on the lessons from the disaster, they realized that togetherness is very important to help each other and socialize and live in this world. They couldn't live in this world alone, by themselves - we need people and somebody and society. So to strengthen and make us stronger we should increase *gotong royong* (HI 05-013).

Thus, the cultural spirit of *gotong royong* provided multi-faceted resilience support mechanism throughout the recovery effort, and continued to support village development, both economically and spiritually.

6.7.3 Cultural values and attitudes

Similar to religious beliefs and community spirit of *gotong royong*, general Javanese culture influenced vulnerability and resilience responses to the earthquake disaster. The Javanese philosophy of *nrimo ing pandum*, which promotes the principles of acceptance and gratefulness, was highlighted by a number of villagers (HI 01-001; 01-007; 01-011; 01-019; 02-002; 02-003; 02-023; 03-005; 03-020; 05-005). *Nrmo ing pandum* guides Javanese behavior through acceptance of fate, and understanding all things as gifts from God (E-12). Many villagers expressed gratitude after the disaster, noting that they were “thankful to God for whatever you get because it could be worse” (HI 01-007). This cultural attitude also influenced perceptions of recovery assistance, with many villagers expressing gratitude for the supplies and food aid received in the immediate aftermath of the disaster (HI 01-010; 01-016; 02-012; 03-002; 03-009; 03-012; 05-012; 05-017; 05-018; 05-028). When asked about their perception of the recovery effort, one villager responded:

Yes, everything was okay especially the goods and food. We just accepted and leave it to the God almighty because we can do nothing. For us everything was fine, it was all because of God. And we are grateful because we still have a chance to live in this world (HI 01-016).

Thus, the *nrmo* cultural attitude influenced responses and perceptions of the disaster and recovery experience and promoted an attitude of acceptance, thereby giving villagers resilience and strength to recovery and rehabilitate psychologically from the disaster. However, this cultural value could be interpreted through a more critical lens: *nrmo ing pandum* promotes acceptance and gratitude in the face of difficult circumstances, possibly limiting adaptive behavioral changes to events such as earthquakes, thereby increasing vulnerability levels (E-10).

Javanese traditions of strong familial and kinship networks also supported recovery after the earthquake disaster. As previously discussed in the social capital section (see section 6.2), strong loyalties and kinship networks within family and village systems contributed to high levels of resilience and self-support mechanisms during the recovery period. Families provided assistance in the form of food and material goods, emergency sheltering, as well as financial and labour support for the reconstruction of temporary and permanent housing (HI 01-003; 01-004; 02-001; 02-008; 03-002; 03-005; 03-018; 03-022; 04-006; 04-011; 04-022; 05-004; 05-014; 05-019). In poorer households, where there was limited financial assistance available, familial and kinship systems provided emotional and psychological support for recovery (HI 02-008; 02-021; 03-025; 04-014; 05-007). Cultural loyalty to hereditary villages also supported recovery, particularly in Wonokromo, where a strong sense of *silaturahmi* contributed to higher levels of assistance (CM-04; HI 04-005; 04-011; 04-013).

Other cultural traditions may have impacts on both vulnerabilities and resiliencies related to preparedness and response after disasters. For example, one interviewee noted that cultural traditions inhibit risk-sharing techniques:

In terms of the social conditions, I think the insurance is not really effective with our trusts or beliefs because we believe in the God in the certain way. So when we prepared something for the bad things it is forbidden in the religion - it's a taboo. So for example, I insure my car and in our traditional beliefs it means I believe my car will have an accident (E-09).

This indicates the importance of understanding cultural traditions and beliefs when attempting to implement recovery programming and disaster risk reduction initiatives: programs and strategies should be in line with cultural beliefs in order to maintain an appropriate level of success and sustainability of programming.

6.7.4 Cultural capital and disaster recovery

Many of the cultural conditions in Yogyakarta and Central Java province contributed to resiliencies observed during the recovery period, particularly through strong religious spirit that provided strength and support for recovery. Conversely, in some villages and households, cultural and religious beliefs contributed to vulnerability through feelings of fatalism and promoted limited disaster preparedness initiatives. As noted in the human capital section, there appeared to be limited educational or psychological programming in these villages to contribute to increased

awareness of disaster risk reduction measures. In conjunction with religious fatalism, this reduced the likelihood that ongoing efforts to implement a disaster management system would be effective at the village level.

Javanese cultural values and traditions also provided support for community recovery and indicated a strong resilience in the aftermath of the earthquake. This is particularly evident through the cultural spirit of *gotong royong*, whereby families and villagers worked together in mutual cooperation in order to clear debris, build temporary shelter, and in some cases, permanent housing. The strong community spirit and capacity within villages was supported through the administration of recovery funding, particularly the housing reconstruction funding. As the recovery effort considered the cultural capital that existed through the philosophy and spirit of GR, this contributed to an intensification of community feelings of togetherness and mutual support. Many villagers felt the spirit of GR improved after the earthquake, as the shared experience of suffering and rebuilding together provided support and strength for recovery (HI 02-013; 02-015; 02-017; 02-024; 03-008; 03-009; 03-012; 03-014; 03-015; 03-018; 03-019; 03-023; 04-017; 04-023; 04-025; 05-013; 05-022; 05-024).

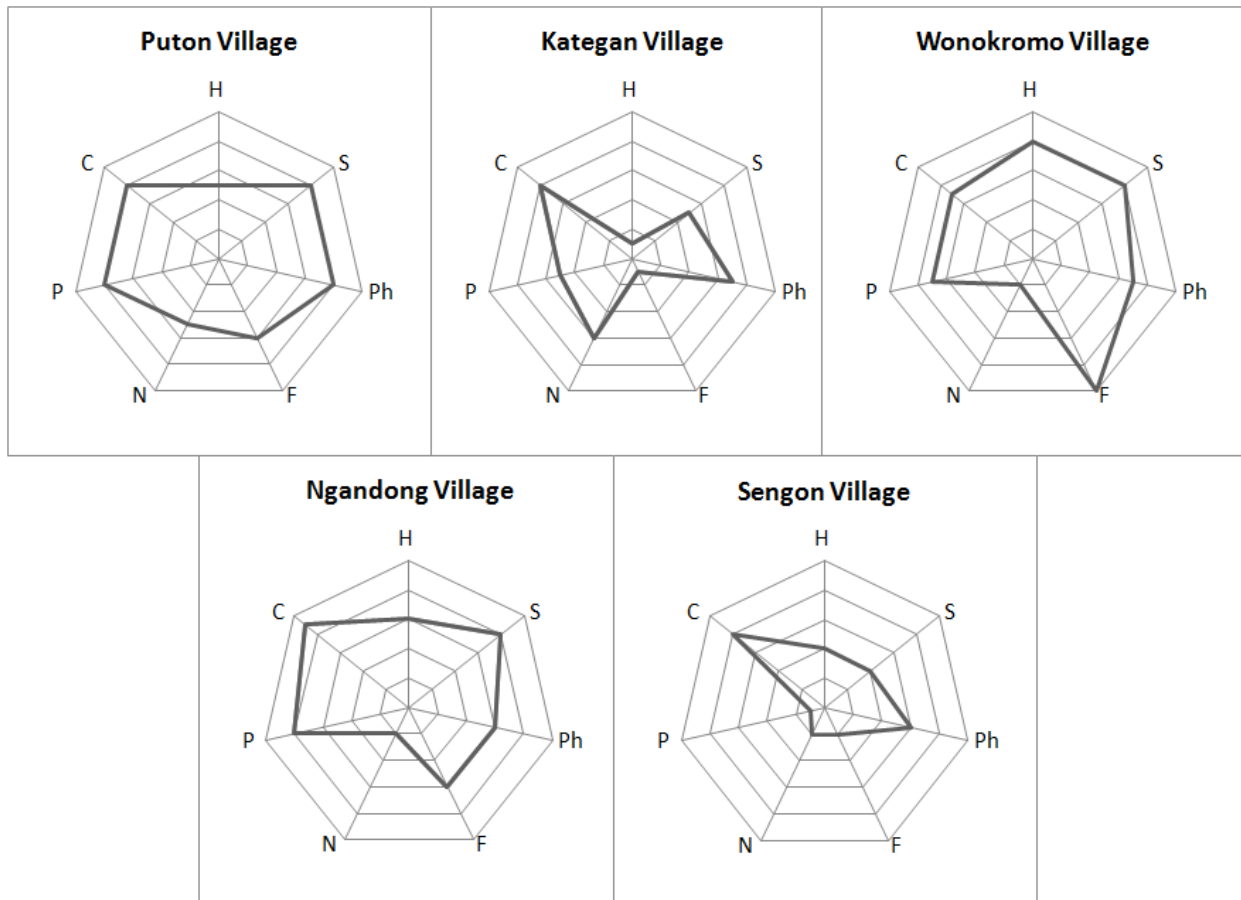
While the use of *gotong royong* is touted in the literature as a strength of the Yogyakarta earthquake recovery effort, the results indicate that the use of GR for permanent housing reconstruction was limited. While the distribution of funding supported community and village organizational capacity, the government deadlines for each phase of reconstruction limited the ability of households to use *gotong royong*. In two villages, a strict adherence to the government building deadlines meant the villagers were unable to use GR: it would have taken too long to take turns building each other's houses and they would have missed the government deadline. In these cases, the government requirements reduced the effectiveness of this cultural strategy for mutual cooperation. In Wonokromo village, where the majority of villagers are employed as government officers, the use of GR was lower due to lack of construction skills among the villagers. Villagers hired labourers from outside the village to rebuild their houses for them. Thus, it is interesting to note that the strongest use of *gotong royong* was among the poorest households, whereas the wealthiest households and communities limited the use of GR. This provides an indication that the philosophy of *gotong royong* and the spirit of mutual cooperation may be more valued by poorer households, where the rewards of participating in community sharing of resources provide the most benefits.

6.8 Summary of Village Capitals

To summarize, Figure 6.8 provides a heptagonal representation of the vulnerabilities and resiliencies associated with the seven sustainable livelihoods capitals for each village. The levels of current capitals available in each village were classified on a scale from low to high, ranked from 0 to 5. These rankings were classified based on the household interviews and focus group discussions, as well as observations made by the researcher. Each capital was subdivided into five categories, representing the different forms each capital could take and each village was assigned a score from 0 to 1, based on a low, medium or high categorization. These scores were then tallied to provide an overall score out of five. This summary is not meant to reflect a precise measure of each capital; instead, the aim is to provide the reader with a visual representation of the different capital conditions in each village. For a more in-depth summary of how each village capital was ranked, refer to Appendix 5.

From Figure 6.8, the different forms of capital available for both recovery after the earthquake, as well as everyday living conditions, are visible. Particularly, the low levels of capital found in Kategan and Sengon are emphasized, corresponding to ongoing difficulties in recovering from the disaster and maintaining adequate standards of living. Conversely, Wonokromo had high levels of capital available in almost all of the seven themes, many of which contributed to faster recuperation times and more complete recovery following the 2006 earthquake. While the score for natural capital reflects the lack of natural resources and agricultural lands available, most households in Wonokromo are not engaged in agricultural and natural resource extraction activities, thus the lack of access to this form of capital does not necessarily impact overall welfare conditions. This is contrary to the experience in Nangdong and Sengon, where issues associated with lack of natural capital had significant impacts on other capital levels for some households. This indicates that the importance of each type of capital may be dependent on place and the conditions of the local context. Puton and Ngandong villages fall in the middle, with improving levels of capital available for recovery, and ongoing implementations of adaptive capacity measures. The correlation between the various capital levels in each village and the quality of recovery experienced after the earthquake disaster supports the use of a framework that integrates concepts of vulnerability, resilience and sustainable livelihoods. This will be discussed further in Chapter 7. Moreover, Figure 6.8 demonstrates how post-disaster recovery is highly variable, and depends strongly on local contextual conditions and capacities.

Figure 6.8: Summary of Sustainable Livelihood Capitals



H = Human Capital, S = Social Capital, Ph = Physical Capital, F = Financial Capital
 N = Natural Capital, P = Political Capital, C = Cultural Capital

6.9 Summary and Conclusion

The results chapter outlined the various vulnerabilities and resiliencies of the five case study villages through a sustainable livelihoods lens, with a focus on seven capitals: human, social, physical, natural, financial, political and cultural. This framework for organizing and evaluating the recovery effort as well as ongoing conditions in each village provided valuable information to support a holistic assessment of the recovery effort after the 2006 Yogyakarta earthquake disaster. The results indicate that while certain capitals were improved, particularly the physical capital section through improved housing and access to water and sanitation facilities, overall, the recovery effort did little to increase local human and political capacities. For many households, financial assets have decreased as villagers sold off assets and used savings to contribute to their ongoing recovery. Thus, for many villagers, they are in a position of increased economic

vulnerability to face future disaster events. A further assessment of the recovery programming is provided in chapter seven, along with a discussion of how the empirical evidence supports a refinement of the conceptualization of resilient disaster recovery.

7.0 DISCUSSION

Within the context of the research questions set forth at the beginning of the dissertation, this chapter emphasizes the three main contributions of the research, namely conceptual, methodological and empirical. Beginning with the empirical contributions, the first section holistically assesses the long-term recovery effort after the 2006 Yogyakarta earthquake, explicitly linking the evidence in chapter six to the concepts of vulnerability, resilience and sustainable livelihoods outlined in chapter two. The second section summarizes the methodological contributions of using the resilient disaster recovery approach as a framework for assessing long-term recovery efforts. This section emphasizes the positives, as well as the drawbacks associated with the conceptual framework for the research. Furthermore, the importance of including each of the concepts of vulnerability, resilience and sustainable livelihoods are explored. In the final section focusing on conceptual contributions, the empirical evidence from the 2006 Yogyakarta recovery effort is examined within the context of the disaster recovery literature outlined in chapter two. This section examines how the research contributes further evidence to support previous research, as well as furthering understanding of recovery as a process. Finally, the section concludes by bringing the evidence and knowledge gained from the research together in order to refine and adjust the conceptualization of resilient disaster recovery outlined preliminarily in chapter three. This final conceptualization of resilient disaster recovery focuses on integrating the concepts of vulnerability, resilience and sustainable livelihoods through a process-oriented understanding of disaster recovery.

7.1 The Empirical Evidence: Assessing the 2006 Yogyakarta Earthquake Recovery Effort

Using the preliminary conceptualization of resilient disaster recovery, the assessment framework used for the research argues that disaster recovery initiatives must address the root causes of vulnerability, increase resilience to face future disasters, and improve livelihoods in order for recovery to be considered successful. While the sections in chapter six provided a summary of the vulnerabilities and resiliencies organized under the seven livelihood capitals, the following sections link the information back to the conceptualizations and models of vulnerability, resilience and livelihoods discussed in the literature review. This will form the basis of the empirical evidence of the holistic, in-depth assessment of the recovery effort after the 2006 Yogyakarta earthquake.

7.1.1 Vulnerability

In section 2.2.1.1, the PAR and Access models of vulnerability were outlined as the conceptualization of vulnerability utilized for this research. In particular, the PAR model highlights the root causes and larger-scale processes that manifest themselves at the local level in order to effectively address vulnerability issues. Root causes of vulnerability can be linked back to levels of access to power, structures and resources, and are influenced by political and economic ideologies. On the other hand, the visible manifestations of vulnerability are represented by ‘unsafe conditions’ and are channeled through dynamic pressures. These include a lack of local institutional capacity, training and skills, ethical standards, as well as through dynamic changes, such as rapid population growth and urbanization, and environmental change (Blaikie, et al., 1994; Wisner, et al., 2004). The following discussion is organized under these three progressions of vulnerability (root causes, dynamic pressures, and unsafe conditions): livelihood issues associated with the Access model will be further discussed in the livelihood section 7.1.3

7.1.1.1 Unsafe conditions

Fragile physical environments, including living and working in dangerous locations and poor quality infrastructure and building standards, are a particularly important component of unsafe conditions in the context of earthquake events. In Yogyakarta after the 2006 earthquake, some of the research villages implemented land use planning changes that contributed to reduced risk for future flooding and earthquake events. While access to transportation, communication, electrical, water and sanitation infrastructure was quite good before the earthquake, the recovery effort contributed to improved water and sanitation facilities in the five case study villages, predominantly for the poorest households. The physical reconstruction effort contributed to numerous improvements in order to reduce the risk for future earthquake and disaster events. For the most part, permanent housing reconstruction followed earthquake resistant construction standards and there were improvements in housing facilities for the poorest households. There also appeared to be an improvement in awareness of construction standards and a shift in thinking towards smaller but stronger housing. The improved physical housing standards are one of the most important contributions of the recovery effort.

In terms of vulnerable society members, the strong capacity of local institutions and community organizations is indicative of strong resilience levels at the community level. Community capacity was supported during the recovery effort through a community-based reconstruction program. This

contributed to further capacity-building as organizations and local governments gained experience with implementing a large-scale recovery program. On the other hand, some of the poorest and most marginalized villagers were generally uninvolved in community organizations and many did not feel confident to express opinions or involve themselves in decision-making processes. This reflects an on-going lack of political and decision-making power for particularly vulnerable groups.

Institutional levels of disaster preparedness have improved through the implementation of a legal framework and national government agency for disaster management (BNPM) as well as the implementation of provincial (BDPM) and local level institutions. This has been supported by the humanitarian sector, which was heavily involved in supporting and developing government response capacity (PDRSEA, 2008; PLANAS PRB & Forum PT, 2009). Shifting disaster management paradigms commenced following the 2004 Indian Ocean tsunami, although the need for the process was buoyed by the 2006 Yogyakarta earthquake. It remained inconclusive whether informal levels of disaster preparedness have improved. While there have been some community-level disaster preparedness initiatives, including community organizations and training/simulation programs, ongoing issues with religious fatalism to hazards appeared to limit the likelihood that individuals and households would engage in preparedness actions.

7.1.1.2 Dynamic pressures

According to the PAR model, dynamic pressures can be organized under two themes: lack of institutions, skills, economic strength, and ethical standards, and; macro-level forces such as population growth and urbanization, and environmental change. Regarding institutions and skills, both Yogyakarta and Central Java have a tradition of strong local governance capacity. As noted in the social capital section (6.1.2), there is also a variety of community level institutions that support village development. The humanitarian and national level government response supported the use of these governance institutions to implement a community-based reconstruction program and further engaged in capacity-building activities to strengthen responses to future disasters. Conversely, although skills training programs were implemented during livelihood programming, low skill levels in impacted villages continue to contribute to high levels of vulnerability.

Although Javanese culture encourages strict moral behaviors, the historical context of colonialism and dictatorship (as discussed in chapter four) has contributed to high levels of corruption in public and government spheres. While the recovery effort promoted transparency and accountability

during the reconstruction program, issues of corruption continued to plague governance institutions. Attitudes towards corruption remained mixed, with those in positions of power remaining relatively unconcerned with holding corrupt individuals accountable. Although the push of humanitarian organizations towards accountability and transparency raised awareness of corruption issues, longer-term shifts in attitudes at all levels of government and civil society are required before changes could be realized. Furthermore, improvements to government pay scales are required to provide acceptable levels of compensation for full time work in order to reduce the necessity of secondary income sources for certain types of government employees, particularly at the local level. Longer term empowerment and accountability issues should also be addressed, by a variety of actors at various scales, in order to increase government accountability to voters and improve political empowerment of the poor. This suggests that changes are required both within the government system, as well as among Indonesian civil society itself.

In terms of macro level forces, population growth and urbanization, as well as environmental change have contributed to increased vulnerabilities in impacted areas. The rural regions exhibit characteristics of the *desakota* phenomenon, whereby rural to urban migration has slowed and economic activities in rural villages have shifted and are becoming increasingly connected to urban centres (Moench & Gyawali, 2008). Although this reduces rural-to-urban migration patterns, increasing population densities have led to development in increasingly risky environments, including along rivers, coastal areas, up-slopes of volcanoes, and hillsides. There has been a shift away from traditional settlement areas and a loss of local knowledge and traditions regarding housing placement and style that contributed to risk reduction historically (E-09; E-10). There was limited emphasis during the recovery effort in terms of recognizing the role of traditional knowledge and transferring that knowledge to current conditions. Environmental change had particularly strong impacts on villagers who remained engaged in agriculture. Unpredictability of wet and dry season weather, changing precipitation patterns, decreased productivity and insect infestations have had negative impacts, particularly in Klaten. While the recovery effort attempted to improve conditions for agriculturalists through irrigation systems, collective farming organizations, seed and fertilizer training and programs, as well as increasing animal husbandry activities, these programs had yet to lead to any significant changes or impacts for farming households.

7.1.1.3 Root causes

Root causes of vulnerability focus on limited access to power, structures and resources, as well as political and economic ideologies that contribute to ongoing marginalization. As noted in the political power section in chapter six, lack of accountability of Indonesian and Javanese government institutions and lack of ability to influence decision-making structures, particularly among the poorest, has contributed to limited access to power. In some cases, those in positions of power and influence have a vested interest in maintaining the status quo, and work against community-based activities to increase knowledge, skills, and overall welfare (E-07; E-16). Thus, ideological thinking and a hierarchal social system has contributed to the perpetuation of low-skilled, low-educated, and low-income households.

Access to a variety of resources, including education, health, skills training, natural resources, livelihood production tools and agricultural land, is driven by a capitalist economic system whereby those individuals and households who can afford it are provided the best access. This limits the ability of the poorest households to gain access to these resources, although government welfare programs for education and health services have contributed to increasing levels of access. Interestingly, a key finding of the research suggests that in the study villages, current government health insurance programs and agricultural farming systems have concentrated vulnerability not among those who are the poorest, but among the social class just above the poorest. This finding was corroborated through the assessment of recovery programming which found that the poorest benefitted from improved housing although the households just above the lowest social class have struggled to replace lost assets and re-engage in livelihood activities. This suggests that vulnerability may not be concentrated among the poorest, most marginalized community members; instead, vulnerability conditions were most severe for poor households.

In summary, the recovery effort after the 2006 Yogyakarta earthquake contributed to reductions in the visible manifestations of vulnerability, particularly in regards to earthquake resistant building standards. On the other hand, the recovery effort had limited contributions towards reducing the root causes of vulnerability and establishing a sustainable system for increasing access to a variety of assets for the poor. This limits the effectiveness of aid interventions, as lack of access to power and resources will continue to perpetuate systems of vulnerability and marginalization. All in all, the earthquake recovery program contributed little to improving access to power and resources,

although it must be acknowledged that these are long-term processes that delve into the realm of advocacy policy structures at national and international levels.

7.1.2 Resilience

The conceptualization of resilience for this research focused on three themes: resistance, recuperation and creativity. These themes focus on the ability of individuals, households and communities to absorb the impacts of hazardous events, recuperate quickly after experiencing a disaster, as well as the ability to learn, transform, mitigate and adapt to future stresses and shocks (Adger, 2000). The following section explores the extent to which the recovery effort contributed to increasing resilience in each of the three themes.

7.1.2.1 Resistance

The capacity to absorb and withstand external stresses and shocks is a fundamental component of resilience. In the case of the 2006 Yogyakarta earthquake, the primary method for increasing the capacity to absorb shocks was through the implementation of earthquake resistant building standards for reconstructed housing. Although it is difficult to test the capacity of housing to absorb or sustain only minor damage in the event of future earthquakes, the acknowledgement by the vast majority of villagers that they followed the construction guidelines indicated that there was an improvement in quality of construction. In contrast, the economic conditions required for building resistance to future hazards remains limited, particularly at the household level. The cost of education and health services remain prohibitive for many families, and ongoing livelihood difficulties further impacted the ability of households to rise out of poverty. Livelihood issues will be discussed in more detail in section 7.1.3.

7.1.2.2 Recuperate

One of the positive aspects of the recovery effort was that the international humanitarian complex recognized the capacities that existed in the earthquake affected region. Through the implementation of a community-driven recovery effort, the reconstruction program allowed local communities the opportunity to use their own capacity to support recovery. This represents an important shift in approaches to recovery: in previous recovery initiatives, impacted communities were generally seen as victims requiring support from external sources in order to recover. The community-driven approach worked to further enhance local capacities to mobilize, organize, and confront the problems and issues encountered for future hazards (Paton, 2006). Working in

conjunction with the humanitarian sector, the resilience of government organizations and villages was indicated through the rapid recovery observed in the region: within two years, almost all of the 350,000 houses destroyed or damaged had been rebuilt (MacRae & Hodgkin, 2011).

While NGO and government sources highlight the completion of the housing reconstruction effort, the research results emphasized the ongoing struggles a majority of households continue to face to finish the construction of housing, as well as rebuild economic and livelihood activities. In many households, the lack of capacity to replenish lost assets and savings suggests that these households have been left with lower levels of recuperation resilience to face future events. This suggests that further assistance is required to more fully support recuperation following major disaster events.

An encouraging trend observed during the recovery effort was the support and capacity-building activities humanitarian organizations provided to government institutions. These capacity-building activities had the objective of developing policies and standards for disaster management plans and emergency response preparations. Those government agencies that obtained experience and training through the Yogyakarta recovery effort have even engaged in knowledge transfer and training to other government agencies: the regency government in Bantul has worked with governments in Sleman, Yogyakarta, in order to facilitate lessons learned into future events, including the nearby 2010 Mt. Merapi eruption recovery effort (E-13; E-15).

While the government in Bantul has yet to be tested following the earthquake, the capacity of agencies in Sleman (who have received ongoing support from humanitarian agencies during the five year period of 2006-2011) to respond to disaster events outside the expected range does not appear to have greatly increased, as evidenced by the poor response to the 2010 eruption event. Government emergency response plans were developed based on 2006 eruption levels, and standard operating procedures were created in accordance with this expectation (E-17). In the 2010 eruption, due to the larger scale of the event, a greater number of individuals and villages were impacted. During the 2010 eruption response, there was a lack of capacity to adapt to changing disaster conditions within the agencies responsible for organizing emergency relief. Particularly, there was a lack of coordination and response capacity was overwhelmed due to the scale of the disaster. This resulted in a response effort which was generally considered worse than the 2006 response (E-07). This suggests that training and capacity-building activities need to continue in order to promote a more flexible and adaptive culture, whereby organizations have the ability to

respond adaptively to present and current circumstances, as opposed to relying on plans and standard operating procedures developed from historical circumstances.

7.1.2.3 Creativity

As noted in the previous section, in some instances, government organizations displayed a limited capacity to adapt and increase level of functioning, particularly in high-stress situations. Lack of adaptability and transformational capacity was also found in several households in the case study villages. While the earthquake recovery effort provided some assistance, particularly for livelihoods, in the form of training and skills development, very few households were able to take advantage of supports due to a lack of skills, networks, and knowledge. This suggests that the livelihood interventions did not fully implement a program based on the skill levels and capacities of impacted villagers, leading to limited positive changes. In order for humanitarian assistance from aid organizations, universities or government institutions, to be successful, a holistic and fully integrative program is required. This will be discussed further in section 7.1.3.

More positively, some villages were able to implement new programming, with support from humanitarian assistance. In particular, Puton village exhibited a remarkable capacity to adapt and transform during the post-disaster period. This can be attributed in large part to *Ibu X*'s passion as a community volunteer and local leader, her high levels of education and commitment to improving and sustaining welfare within the village, and her strong external networks to humanitarian and university organizations. The Puton example provides evidence to support the assertion that the disaster recovery period can provide a 'window of opportunity' to promote positive growth and transformation at the community level, with the right type of support and intervention strategies.

7.1.3 Livelihoods

DFID's sustainable livelihoods framework provided the conceptualization of livelihoods utilized in this research, specifically through the asset heptagon, as a method for organizing vulnerability and resilience information. As the vulnerabilities, resiliencies, and access to the seven livelihood capitals was discussed previously in chapter six, the following section outlines a more complete understanding of the livelihood concerns of villagers. The evidence related to ongoing livelihood issues and interventions during the earthquake recovery period provided further evidence to

support the overall assessment of the 2006 Yogyakarta recovery effort, as well as support the linkages among vulnerability, resilience and livelihood issues, to be discussed in section 7.2.

As noted in section 5.1, prior to the earthquake disaster, Bantul and Klaten had significant poverty levels, at 18.5% and 23.3% respectively (BAPPENAS et al., 2006). At the time of the earthquake, almost half of households (approx. 47%) in impacted areas were engaged in small-scale agricultural activities as a primary livelihood strategy: the majority of these households represent low-educated, low-skilled individuals, particularly women, older generations and the landless (Government of Indonesia, 2007). These agriculturalists tend to have small land plots, simple technological inputs, and low agricultural outputs (UGM & IRP, 2009). In four of the case study sites (excluding Wonokromo where employment is predominantly in the government sector), the majority of non-farming employment was comprised of construction labourers, small-scale home enterprises (such as *warungs*, food production of snacks, and other small businesses), and a small minority of government sector employees (CM-01; CM-02; CM-03; CM-05). Approximately 20% of these small-scale, home-based enterprises are considered ‘poor’, with less than \$1 USD/day in earnings (Callander, 2007). This provides evidence to support the assertion by Setiawan (2009) that prior to the earthquake, impacted areas were “already facing the pressures of poverty” (p. 35) and experienced ongoing livelihood struggles.

The earthquake disaster resulted in further negative impacts on economic and livelihood issues: the destruction of small- and medium-scale enterprises, damage to traditional market facilities, loss of productive assets, and loss of income (BAPPENAS et al., 2006). As a result, the recovery effort incorporated an economic and livelihoods focus, although these activities generally commenced in mid- to late-2007, over a year after the earthquake (Setiawan, 2009). Furthermore, livelihoods programming received significantly less funding compared to the shelter sector, and strategies for recovering livelihoods, particularly at the government level, were limited (E-14). As noted in section 4.3.2, these interventions generally took the form of capacity building and training activities, the provision of credit facilities, replacement of production tools, and agricultural supports (see IOM, 2011; IOM, 2010; JRF, 2007a; JRF, 2008). While certain villages in Yogyakarta and Central Java province received ongoing, in-depth support from major funding agencies, including the IOM and ASB, none of the villages selected for this research received long-term livelihoods support.

Despite the fact that there was a focus on livelihoods rehabilitation following the 2006 earthquake, in the case study sites, many villagers whose entrepreneurial activities were destroyed by the earthquake noted that they did not receive assistance to replace production tools and restart their businesses. Examples of the variety of businesses that were destroyed in the earthquake and did not have matching livelihoods re-establishment programs include tofu selling (HI 01-007), electrician (HI 02-009), carpentry (HI 02-018), turtledove breeding (HI 03-001; 03-006), quail egg businesses (HI 03-007; 03-008; 03-015), steel welding (HI 03-016), chicken nursery (HI 04-001), clothing design and production (HI 04-007), tailoring (HI 04-010), paper recycling (HI 04-013), fish breeding (HI 05-006), *warungs* (HI 05-017), and food catering (HI 05-018). The variety of businesses is indicative of the diversity of entrepreneurial activities in the region, yet none of these households received support in order to re-establish their home-based business activities.

While credit facilities were established for villagers to take loans to restart their livelihood activities, either the income generation from the enterprise was too small to support the cost associated with productive tool replacement, or the significant amounts of money required to replace lost assets was considered too risky by the household (HI 01-009; 01-010; 01-012; 02-006; 02-009; 03-001; 03-002; 03-005; 03-007; 03-008; 04-010; 05-003; 05-004; 05-006; 05-016; 05-017). It is also important to note that many villagers sold their household assets in order to support daily living needs and reconstruction of housing in the aftermath of the earthquake (see section 6.4.2 on level of savings). Thus, many households were living in precarious financial positions, having difficulty maintaining adequate daily needs and fund the housing reconstruction effort. Taking loans to restart damaged entrepreneurial businesses was a further indebtedness that many households were unwilling to undertake. This indicated that provision of capital support, in the form of productive tool replacement or cash grants, is a support mechanism required in order to jumpstart the diversity of entrepreneurial activities in the post-disaster period.

For those villagers who did not previously have small-scale businesses, the need for ongoing skills training was highlighted. Particularly, villagers with low skills and low levels of education were hoping for ongoing training and skill development. One villager argued that this would help improve the overall economic condition in the region, as well as contribute to more holistic recovery:

I want the government to pay more attention to the people and provide more job opportunities and skill and training and work on improving the economy. The

government didn't provide enough courses to give us skills to try a new life. Because everything is gone and destroyed after the earthquake and they should try to give support and jobs and spirituality. Not just material, but also immaterial support (HI 01-021).

While the implementation of micro-credit facilities improved access to capital for diversifying and establishing new entrepreneurial activities, some villagers were skeptical of their ability to successfully commence businesses without further support (HI 02-003; 02-015; 02-020):

We only have junior high school education so even if we received loans or money for improving the life or income, we don't know what to do with it: don't know how to market the product. If there is a skill course, we will follow it. We are willing to improve our lives but we don't have any skills to do this. So it's not just about having money but we don't have the skills to use the money effectively (HI 02-002).

Thus, the vulnerability conditions of the villagers reduced their capacity to take advantage of the micro-credit programming implemented during the recovery period. This provides support for an approach whereby credit and capital facilities are provided in conjunction with training and skill development, as opposed to just increasing access to credit facilities.

While the above villagers highlighted the need for further training, other villagers received livelihoods training, particularly for sewing training, food production (such as *kripik tempe*, *kripik pisang*, and *cendol*), and handicrafts (HI 01-004; 01-008; 01-016; 02-007; 02-008; 03-005; 03-007; 05-018; 05-024; 05-027). Unfortunately, many of these households were unable to reap any benefits from training due to lack of marketing skills and networks to promote the products they had been trained to make (HI 01-004; 01-008; 01-012; 01-016; 01-018; 02-001; 02-007; 02-008; 03-003; 03-005; 03-007; 05-018; 05-024; 05-027). As one villager noted "social programming in this village is such a wasting time (sic) because there's no follow-up after the training" (HI 03-007).

A further aspect that limited the success of livelihood programming was the narrow focus of intervention activities. In all villages, the PNPM Mandiri sewing and small animal husbandry activities were mentioned as one of the main livelihood interventions, except for Puton where a range of strategies were deployed through funding from Hanseo and Gadjah Mada universities. Implementing a narrow range of livelihood strategies led to increased competition and over-saturated the labour force for particular types of employment. While in theory, the provision of

credit facilities would allow for a diverse range of livelihood strategies to be implemented at the village level, in reality, many villagers lacked the skills and knowledge to be able to take advantage of unique livelihood opportunities (E-06). Of the villagers who expressed a desire to start a home-based business activity, almost all were interested in opening a small *warung* shop. If all these villagers opened a *warung* shop, this would have a negative impact on surrounding businesses, including a reduction in available markets, limiting the overall success of businesses through over-saturation and increased competition, ultimately leading to an overall reduction in income levels (HI 01-004; 03-001; 04-004; 04-023). In Puton, livelihood programming has achieved greater success due to the long-term support provided (through the 5-year funded development plan and community taxation program), and training to support a variety of livelihood interventions.

The above results suggest that in order for livelihood programming to be successful, organizations need to take a four-pronged approach:

1. Provision of capital and credit facilities to support the initial phases of starting a business;
2. Provision of training to promote skills to make quality products;
3. Marketing and networking support to promote the sale of products;
4. Implementation of a diversity of feasible livelihood options.

Without this holistic support, the money spent on livelihood interventions appears to be wasted, as few villagers are able to take advantage of the programming. The data from villagers indicated that the lack of a holistic approach resulted in limited changes in livelihoods and economic conditions in disaster-affected areas (E-06). This sentiment is summed up by one villager who noted:

After the earthquake they said everything will be getting better or at least the same - but it's not! The recovery must increase the welfare of the people, provide job opportunities and economic recovery because of the decrease in economics after the disaster. They need to focus more on economic aspects which is very important to the people (HI 01-024).

While the above sections highlighted the unsuccessful aspects of livelihood recovery, it is important to note that some households benefited from livelihood programming. Villagers who received the PNPM Mandiri sewing program highlighted the positive impacts in terms of improving their skills and replacing sewing machines that were destroyed in the earthquake (HI

01-013; 01-015; 05-020; 05-025). The improved access to credit facilities also supported increased economic conditions for villagers who were able to use loans to support business growth (HI 04-014). Accordingly, for a limited number of households, the livelihood programming was successful in terms of improving economic conditions and increasing the diversity of household income strategies.

To summarize the assessment of the livelihood recovery effort, the majority of villagers believed livelihood recovery was either unsuccessful or that the economic conditions remained the same as before the earthquake. This is supported by data from other research which suggests that unemployment rates in Bantul have doubled since the earthquake (UGM & IRP, 2009). Therefore, the ‘window of opportunity’ for improving economic and livelihood conditions was not taken advantage of, and in some cases, households are living in more precarious and vulnerable conditions.

Linking these responses back to the conceptualization of sustainable livelihoods provided in the literature review, including DFID’s SLF model, as well as the Access model, the findings demonstrate the interaction between vulnerability and livelihood strategies and outcomes. The availability of livelihood assets was influenced by social relations, structures of domination, and transforming processes, and have impacted the ability of households to engage in livelihood activities. This occurred in conjunction with individual decisions and agency processes, including; decisions to participate in training and skill development, risk choices to start new businesses, strategies for networking and marketing their products and skills, as well as investments of business capital. Focusing specifically on the interventions highlighted in the Access model (see Figure 2.5), the results from the 2006 Yogyakarta recovery programming suggest that there was little adaptation in livelihood strategies following the earthquake, and financial and asset accumulation has been limited, leading to increased vulnerability in facing future stresses and shocks.

7.1.4 Summary of Empirical Assessment

In conclusion, the empirical evidence suggests the recovery effort contributed to reductions in the visible manifestations of vulnerability through improvements in housing standards. On the other hand, little reduction in vulnerability was observed in connection with root causes and ongoing issues associated with other forms of vulnerability, such as financial and human capital. In terms of

resilience, impacted villagers had high levels of certain forms of resilience, including strong social and cultural coping mechanisms, prior to the disaster. The recovery also contributed to resilience through supporting a community-based recovery program that emphasized improvements in construction standards, made use of local capacities, and provided institutions with experience in responding to a large-scale disaster event. On the other hand, resilience at the household level either remained the same or was reduced due to ongoing struggles with recovery and lack of livelihood strategies. The recovery programming did not effectively integrate a holistic economic program to fully support individuals and households through all stages of livelihoods, from training, capital and marketing support. This suggests that the recovery effort superficially reduced some forms of vulnerability, although other forms of vulnerability were increased and the underlying issues and problems in villages were not sufficiently addressed.

7.1.5 The Humanitarian-Response System - Failure of Design?

The humanitarian response system, in conjunction with government agencies, has increasingly focused on issues of vulnerability and resilience during disaster recovery periods, particularly at the policy level. For example, the documents of many organizations highlighted the importance of addressing the root causes of vulnerability in order to implement long-term sustainable shifts in society. Yet the evidence uncovered in the research suggested that the recovery effort only engaged in cursory recovery, focusing on addressing unsafe conditions, as opposed to root causes.

Although the recovery assessment suggests government and humanitarian organizations did not sufficiently address root causes, it does not appear that the humanitarian response system employed after the Yogyakarta earthquake is designed to engage in the programming and actions that would contribute to long-term vulnerability reduction. NGO practitioners highlighted the funding and accountability structures that limited the potential for humanitarian organizations to effectively utilize the long-term recovery period to address underlying conditions of vulnerability:

People are measured according to how much money they can spend and how fast. Nobody in their job performance gets measured in terms of the impacts and changes they are making in the communities – that’s disappointing. So it means people are coming in for six months and spending the money and then they get promoted. If they come in for six months and say it’s going to take a lot more than six months to spend this money in a reasonable period – you are going to get fired (E-01).

Thus, the funding structures and internal culture of the humanitarian response agencies effectively limited the type of assistance that could be provided to support long-term vulnerability reduction and resilience building activities. The current system maintained an approach that focused on superficial recovery strategies, thereby limiting the sustainability and effectiveness of interventions. This type of approach was found throughout the recovery effort in Yogyakarta, where some organizations focused on outputs (i.e. number of houses built, number of construction workers trained, number of pamphlets distributed) as opposed to actual changes observed at the ground level (E-02; E-06).

The accountability structure of humanitarian organizations also limited the ability to use the ‘window of opportunity’ to implement sustainable programming initiatives. Accountability structures have a tendency towards donors and funding agencies, as opposed to the individuals and communities the aid is supposed to be helping. Particularly when donors and funders are not well-versed in local customs, cultures and needs, humanitarian programming has a tendency towards easily identifiable and quantifiable outputs that can be achieved in short periods of time. In the eyes of donors, this may contribute to perceptions of improved accountability of the humanitarian agency, implying the organization is capable of implementing a program that achieves quick and effective results. Unfortunately, this type of approach limits the type of programming that can be implemented as well as the overall effectiveness of long-term objectives:

It’s very hard to justify [responses to] an earthquake where after two years you don’t have your final project output – which from a livelihoods perspective could be well justifiable as you need that time to set something up and get it going. But then we’d all be up for criticism that ‘oh you haven’t gotten any results’. So the political pressure from donors, funders, taxpayers prevents that (E-06).

Thus, the humanitarian response system does not appear to be designed to accommodate all aspects of the ‘window of opportunity’ provided by disaster events in order to effectively reduce vulnerability and build resilience to respond to future stresses and shocks. The structure of these agencies limited their ability to achieve the goals and objectives they themselves stated they were trying to achieve. A shift towards long-term programming, increasing awareness of donors, and adjusting the accountability focus to include impacted households and communities would improve the ability of these humanitarian organizations to meet their own objectives.

7.2 Methodological Issues: The RDR-AF Evaluation Tool

The RDR-AF model was designed as an evaluation methodology to assess the impact of long term recovery efforts. Specifically, the model provided a preliminary conceptualization of what resilient disaster recovery should look like, creating an optimized model of successful recovery. This effectively linked recovery to key concepts in the hazards literature, including vulnerability, resilience and sustainable livelihoods. As the case study assessment in section 7.1 demonstrated, this approach allowed a comparison between the actual achievements of a specific recovery effort to an idealized conceptualization of what recovery could accomplish. The approach also provides a holistic model, focusing on a wide range of factors that impact overall recovery and reduce the risk of future disaster events.

Although the RDR-AF approach presents an alternative method for assessing the impact of humanitarian assistance (outlined in chapter three), the constraints and difficulties associated with conducting such a holistic evaluation are similar to those identified in the humanitarian impact assessment literature. These include the difficulty is assigning causality and attribution, limited baseline data to make comparisons, lack of capacity to engage in evaluations of long-term impacts, timing and scale issues of assessment, selecting appropriate indicators, as well as implementation issues (ALNAP, 2006; Beck, 2009; Hofmann, 2004; Proudlock, Ramalingam, & Sandison, 2009). Although there has been increased focus on providing guidelines for assessing the impact of humanitarian assistance, there has rarely been any systematic analysis of the long-term impacts of overall recovery programs (Buttenheim, 2010; Edgington, 2010). The following sections outline the positive and negative aspects of the RDR-AF model in order to determine the effectiveness of using such an approach to assess long-term disaster recovery.

7.2.1 Benefits of the RDR-AF Model

The results of the research outlined in chapter six suggest that the RDR-AF was an effective conceptual and methodological framework for evaluating long-term recovery through a focus on root causes of vulnerability, resilience to face future disasters, and improving the sustainability of livelihood strategies. This evaluative tool allowed the assessment to move beyond the surface aspects of recovery, particularly the housing reconstruction (which by all aspects was relatively well done), and incorporate a holistic understanding of a variety of aspects influencing the welfare of households and communities. A comparison only to pre-disaster levels would provide limited

analysis of the ongoing conditions of vulnerability and livelihood struggles, and achieved little in identifying aspects for further resilience building. Thus, this approach provided a more in-depth assessment of ongoing conditions, particularly through understandings of lack of access to a variety of resources.

Through the holistic approach provided by the RDR-AF model, the assessment of recovery focused not just on interventions, but also on missed opportunities. If the analysis focused exclusively on the effectiveness of programming interventions, areas or sectors where there was limited recovery programming might have been overlooked. For example, many households indicated they struggled with ongoing issues of psychological trauma and lack of hazards knowledge. A focus on systematic issues of vulnerability also highlighted continuing issues with lack of access to a variety of material and immaterial assets, including education and health resources, as well as decision-making power. The livelihood analysis identified the limited long-term impact of economic interventions. Thus, through the RDR-AF approach, the need for further emphasis on programming and interventions in these sectors was identified.

The timeline for data collection under the methods adopted for the research also suggested a benefit over traditional humanitarian impact evaluations. In cases where evaluations and program reports are completed, data collection is generally taken either during or at the ending point of the programming (Beck, 2009; Bутtenheim, 2010). This suggests that evaluations would be conducted while beneficiaries continued to receive support. On the other hand, the RDR-AF takes a process-oriented approach which explicitly recognizes the dynamic nature of recovery. In this research, the data were collected anywhere from one to three years after government and humanitarian organizations had completed their recovery activities allowing for an assessment of the longevity and sustainability of interventions. In the Yogyakarta case study, particularly for livelihoods programming, the data suggested that little has been done to contribute to long-term changes in livelihood strategies and outcomes. Thus, the RDR-AF approach provides a deeper understanding of how recovery programming may contribute to long-term transformations at the household and community level, both positive and negative.

The importance of scale and the impact it has on understanding the concept of place was highlighted in the research through the RDR-AF. While an area can be defined as a 'place' based on the shared experience of a disaster event, this assumes that the area has some form of homogeneity. The different experiences and characteristics of each village (including livelihood

strategies, government structure, village history, levels of education etc.) and even differences within villages indicated that the concept of place is not necessarily applicable to the entire area impacted by one disaster event. Although some experiences were found to be similar across all villages (i.e. the use of *gotong royong* as a cultural strategy for recovery, the use of pre-existing organizations to effectively control and distribute aid), the livelihood activities and problems, political and geographic conditions, community experiences and long-term recovery efforts were different for each of the five villages. This implies that places exist within places; a true understanding of place may require a focus on various levels of scale, from the smaller-scale communities through to provincial and national levels. Although the majority of this research focused on the local scale, the RDR-AF approach provides an opportunity to highlight the experiences of various places through a multi-scalar approach, highlighting what occurred in individual villages, along with regional and provincial comparisons.

A final benefit of the RDR-AF approach is through the use of participatory methods that incorporate the views and opinions of beneficiaries and impacted households. Using participatory approaches for humanitarian impact evaluations have been identified as just one of three approaches for conducting assessments: the remaining approaches focus on quantitative measures of impact, as well as deductive/inductive approaches (Hofmann, 2004). Of these three approaches, the participatory approach, focusing on the perceptions of impacted and affected households, has rarely been used in the humanitarian sector (Proudlock, Ramalingam, & Sandison, 2009). The RDR-AF approach focused specifically on identifying the views of beneficiaries, thereby explicitly acknowledging a focus on impacts and processes, as opposed to outputs, and accountability towards impacted populations.

7.2.2 Challenges related to implementing the RDR-AF Model

Similar to any assessment of humanitarian programming, there were challenges in implementing the RDR-AF approach to evaluate the overall recovery effort. The first issue is associated with lack of baseline data. In this case study, there was limited data to make comparisons between pre- and post-disaster conditions for individual households. Due to the lack of baseline data, information regarding pre-disaster conditions was derived from individual recall. This approach may result in erroneous data due to recall errors (Buttenheim, 2010). For example, there appeared to be errors in recollecting the length of time in temporary housing, as noted in section 6.3.1. On the other hand, when villagers were asked to compare current conditions to pre-disaster conditions, many

respondents were able to highlight specific factors that influenced their views, such as lower income levels, smaller housing, and loss of production tools, etc. They were also able to identify aspects of the recovery that they felt had improved, suggesting some level of accuracy in recall of prior conditions. Although memories of prior conditions may be accurate, the lack of baseline data and methods for ensuring the validity of statements represents an ongoing issue for the assessment.

A second issue involved the linkages between current conditions and recovery programming. There was some difficulty establishing causality between the humanitarian intervention and changes in beneficiary conditions (Proudlock, Ramalingam, & Sandison, 2009). While one approach would be to assign a counterfactual, in other words, to compare groups who received interventions versus those who didn't, ethical and methodological issues have been highlighted regarding this approach (Buttenheim, 2010). A second approach, utilized in the RDR-AF model, is to use theory-based methods to "examine a particular case in depth to explain how an intervention could be responsible for specific changes" (Proudlock, Ramalingam, & Sandison, 2009, p. 6). Causality linkages are inferred from contextual information provided by the research participants, including villagers, government officials, academics and NGO practitioners. This approach is required as the purpose of the case study approach is to examine the recovery effort in its entirety, as opposed to comparing beneficiaries to non-beneficiaries. Furthermore, the case study method seeks to understand the recovery effort holistically, as opposed to focusing on the specific outcomes of one particular program or intervention. Nevertheless, inferring comparisons does challenge the ability of the research results to make conclusive statements regarding the impact of specific humanitarian and government interventions.

A further challenge with implementing the understanding of resilient disaster recovery in the assessment framework relates to approaching recovery as a process. The RDR-AF conceptual approach recognizes the dynamic nature of recovery and changing conditions of vulnerability, resilience and sustainable livelihoods. While the data collection phase spanned a period of almost eight months, in the long term, this may represent more of a snapshot of the long-term recovery as opposed to process. Viewing recovery as a long-term process implies using a longer-term evaluation methodology that explores causal relationships, although the time and cost issues associated with this suggests it is impractical. Thus, the results capture a snapshot of the recovery process over an eight month period, and it is recognized that conditions may have already changed in the study area.

A final challenge of the RDR-AF approach is in regards to the logistics of conducting the research. The framework suggests the need for an in-depth understanding of a variety of contextual and intervention programs at various scales. The wide breadth of information needed required a considerable amount of time and effort in terms of background information on the disaster, understanding of contextual information, including language, culture and customs, as well as opinions and perceptions from a variety of actors, at various scales. The multi-scalar approach was difficult to implement, and much of the results of the research focused on the community level. The amount of information required from research participants was time-consuming and can exceed reasonable expectations for assessment. As noted in chapter three, the amount of data collected was reduced, as the length of pilot household interviews was almost three hours. This suggests that a more standardized household survey approach for collecting information may be necessary for future implementations of the RDR-AF, in order to satisfy information needs within acceptable time commitments on the part of research participants.

7.2.3 Integrating Vulnerability, Resilience and Sustainable Livelihoods

One of the important benefits of the RDR-AF model is the integration of vulnerability, resilience and sustainable livelihoods into an applied evaluation framework. Through this approach, a wide range of factors and processes that influenced the disaster experience (as discussed in chapter 2) were analyzed. The results of the research suggested the importance of incorporating all three concepts when holistically assessing long-term recovery and determining whether risk of future disasters has been reduced. Vulnerability was an important concept to understand the underlying processes impacting individual, household and community ability to access and effectively utilize a variety of material and immaterial assets. Underlying conditions of vulnerability were linked to the capacity of individuals, households and villages to take advantage of the resources provided during the recovery programming. Those with higher vulnerability were less successful in benefitting from the recovery programming, while those with less vulnerability were able to access a greater share of the resources available.

The resilience perspective provided an understanding of the characteristics that contributed to capacities to absorb, recuperate quickly, and transform following the earthquake. The villages that have had the most success in terms of using the recovery effort to implement improvements and changes in living conditions, overall welfare and standards of living were Puton and Ngandong - the two villages that were highlighted for their adaptive capacity following the earthquake and the

strength of their political leadership. This supports the integration of a resilience framework that focuses not only on capacity to absorb and recuperate quickly from hazardous events, but also to take advantage of the resources and specific conditions available in the aftermath of a major disaster event.

The importance of incorporating livelihood initiatives into vulnerability reduction and recovery efforts should be emphasized. In communities and households where livelihood recovery was successful and income sources were reliable and sustainable, overall perceptions of recovery were more positive and quality of life conditions either remained similar to pre-disaster conditions or had improved. In other cases, where livelihood conditions deteriorated, the perception of the recovery effort was not as positive and quality of life conditions were stagnating or had declined. This suggests that successful livelihood interventions should form an important component of recovery programming, and as such, should be included in any assessment of overall recovery programming.

To summarize the methodological contributions, the results from the research reaffirm the usefulness of the RDR-AF model. The RDR-AF provides a unique perspective on evaluating recovery through a focus on holistic assessment that emphasized a comparison to an idealized conceptualization of disaster recovery. The importance of integrating the three concepts of vulnerability, resilience and sustainable livelihoods was highlighted. Integration allowed for an effective assessment of recovery programming and comprehensive understanding of the current conditions of impacted villages and households. Moreover, incorporating aspects of vulnerability, resilience and sustainable livelihoods was useful for providing a holistic analysis of the long-term recovery effort after the 2006 Yogyakarta earthquake.

7.3 Conceptualizing Disaster Recovery

While the above section highlighted the usefulness of the RDR-AF approach for evaluating recovery, the following section further refines the conceptualization of resilient disaster recovery as a process. In order to achieve this objective, the section begins by returning to the recovery literature outlined in chapter two. The evidence from the case study is used to either support or extend recovery knowledge, providing an indication of important concepts that should be included in the re-conceptualization of resilient disaster recovery. Subsequently, the contributions of the research for understanding the intersections and relationships between vulnerability, resilience and sustainable livelihoods are provided. This will provide further evidence to support the refinement

of the final resilient disaster recovery conceptual output. Finally, the revised conceptualization of resilient disaster recovery is outlined, focusing on key issues and processes identified throughout the research.

7.3.1 Returning to Recovery Theory

One of the objectives of the research involved contributing to disaster recovery knowledge and understanding resilient disaster recovery as a process. Thus, the following section returns to the recovery theory presented in chapter two and the results of the case study are used to provide support for previous recovery theory, as well as contributing to further understanding. The discussion will be organized under the five patterns of organizational behavior delineated by Barton (1969) in section 2.1.1. Furthermore, these sections are important for outlining important recovery concepts that should be incorporated into the revised conceptualization of resilient disaster recovery.

7.3.1.1 Strength of local government institutions

Barton (1969) suggested that major disaster events often overwhelm the capacity of local government institutions. These organizations may be unable to effectively cope and respond to the disaster event, requiring replacement by improvised government agencies. In the 2006 Yogyakarta recovery effort, the government did establish coordination agencies in both Yogyakarta and Central Java province in order to administer relief and recovery programming. Organizations for administering permanent house reconstruction funding were also established, including POKMAS in Yogyakarta province and RR in Central Java province. While this might suggest incapacity of the local government to respond, in fact the opposite is true. These agencies were established by the regional, provincial and national governments in order to effectively establish the needs of impacted populations, coordinate information and disseminate recovery programming, as well as monitor recovery activities. Hence, there was a strong government capacity to respond, and the utilization of local administrative and coordination organizations may result in improved capabilities to respond to future events (Lewis, 1999). Furthermore, this provides an example of how local governments can be empowered to manage recovery efforts, thereby leading to a strengthening of government recovery institutions (Clinton, 2006; McEntire, 2001).

One of the reasons the recovery program in Yogyakarta was able to effectively use local government agencies was due to the nature of damages. Local and provincial government

institutions in both Yogyakarta and Central Java provinces were largely unaffected, and the lower number of deaths (compared to disasters such as the 2004 Indian Ocean tsunami) meant that social institutions remained intact (Manfield, 2007). Thus, in Yogyakarta, the recovery effort was able to effectively utilize local government resources, and newly established recovery and reconstruction agencies worked in coordination with government agencies, as opposed to replacing them. This is dissimilar to the experience in Aceh after the 2004 Indian Ocean tsunami, whereby major reconstruction and rehabilitation agencies were established to supplant local government institutions that were themselves heavily impacted by the disaster (Fengler, Ishan, & Kaiser, 2008). This suggests that disaster events do not necessarily lead to incapacity of local government institutions to respond; while coordination and recovery agencies may be established in the post-disaster period, the extent to which this involves the replacement of local government institutions may be largely dependent on the pre-existing capacities of the local government, the scale of the disaster and the damages to human capital in the region (E-01). In any case, if coordination and recovery agencies are established, they should be working in conjunction with local government institutions, regardless of capacity or impacts, in order to improve local government capabilities, contribute to the sustainability of recovery programming, and facilitate an approach that empowers impacted populations to be involved in the recovery process (E-06; E-12; E-16).

7.3.1.2 Responsibility of relief organizations

Historically, recovery programming after major disaster events has had a tendency to fall to the responsibility of humanitarian organizations, particularly in developing countries. According to Barton (1969), due to the variety of organizations involved in recovery efforts, there may be competition and breakdown in coordination. The Yogyakarta case study does not support this assertion. The leading funding agency was the Indonesian central government, and local government institutions played a major role in the reconstruction program, as discussed in chapter four (E-06). Furthermore, the behavior of relief and recovery humanitarian organizations was implemented through a 'lessons learned' approach whereby issues of competition and inefficiencies in the 2004 Aceh recovery effort were addressed during the 2006 recovery program in Yogyakarta (E-07).

Under the UN cluster system, the humanitarian sector has moved towards a coordinated structure for improving the implementation of disaster aid and recovery programs. The relief and recovery programs triggered by the 2006 earthquake was the second time the UN cluster system was

utilized, and potentially allowed for improved coordination, decreased competition between organizations, increased quality in the provision of relief and recovery services, and ensured greater accountability²⁵ (IASC, 2006; MacRae & Hodgkin, 2011). The push by humanitarian organizations for increased accountability and coordination suggests a shift towards improving the implementation of humanitarian assistance, as suggested by Clinton (2006). On the other hand, further evidence is required in order to determine whether this was unique to the Yogyakarta recovery effort, or whether learning and change has been applied in other major disaster events with large humanitarian response, such as the 2010 Haiti earthquake.

Moreover, the role of humanitarian organizations has been increasingly recognized as more facilitatory in nature as compared to on-the-ground implementation of recovery programming. Humanitarian organizations should be used to provide local governments and communities with information on standards, technical assistance, and implementation strategies (E-03; E-14). Through governments and local communities sharing in the responsibility for implementation and the day-to-day running of recovery programming, sustainability of disaster risk reduction initiatives is promoted (E-06). Furthermore, development activities are based on the needs of the community as opposed to the needs of donors, funders, and organizations (E-16). This should also contribute to increased efficiency, as it limits the necessity of humanitarian organizations using funding to establish offices, housing, transportation, and communication facilities for NGO practitioners, which can take up significant portions of recovery budgets in some cases (E-01; E-16). Hence, particularly in places where governance capacity is stronger, the role of humanitarian organizations should be to work in conjunction with governments, and facilitate optimal recovery, as opposed to replacing governance institutions and response mechanisms. This type of facilitatory approach also recognizes that households and communities should drive their own recovery, as highlighted in Clinton's (2006) ten propositions for building back better.

In the case of some large humanitarian organizations, there has been an increase in partnerships with local NGOs in order to facilitate understanding and awareness of the context and community needs. Unfortunately, in the context of a major disaster event, many local NGOs are established in the relief and reconstruction period in order to take advantage of funding and employment opportunities, and are dissolved once the funding from international donors is completed (E-16).

²⁵ While the research did not specifically evaluate the UN cluster system, improvements in coordination and provision of services compared to the 2004 response in Aceh after the Indian Ocean tsunami highlight the implementation of lessons learned, decreased competition and improved provision of services after the 2006 Yogyakarta earthquake (MacRae, 2008; Manfield, 2007).

Not only does this limit the capacity to implement ongoing long-term programming, but there may be impacts on the effectiveness of capacity-building activities in the region: social networks developed throughout the recovery period are dissolved along with the local recovery organizations (E-01). In some cases, the newly established local NGOs have limited capacity to translate the program objectives and requirements of the international donor to the local community. This occurred during the implementation of the JRF housing reconstruction program, whereby the local monitors and trainers misunderstood the JRF reconstruction guidelines and disallowed the re-use of housing materials (E-16). While local facilitators indicated these guidelines to villagers, the JRF did not restrict the re-use of materials, indicating some level of misunderstanding of the reconstruction program requirements (E-04). This indicates a need for international NGOs to develop local partnerships and networks in the pre-disaster period with legitimate local NGOs that are engaged in long-term capacity and development activities in the impacted region. Moreover, this process could also be used to develop communication lines and facilitate local understanding of key program objectives.

7.3.1.3 Public perception of recovery activities

As noted by Barton (1969), public perceptions of recovery operations from both government and humanitarian sources are driven by rational assessment of achievements as well through symbolic gestures. The results from the research support this suggestion. Respondents provided rational assessments of the process and outcomes of the implementation of recovery programming, and noted appreciation for efforts, even in cases where the project failed to meet objectives (i.e. the JRF irrigation program in Ngandong which contributed to increased flooding of agricultural fields). Many villagers were able to recognize both the positive achievements of the recovery programming, such as the housing reconstruction offering some improvements in terms of safety and construction standards, as well as aspects of recovery that were not as successful, particularly the livelihood programming.

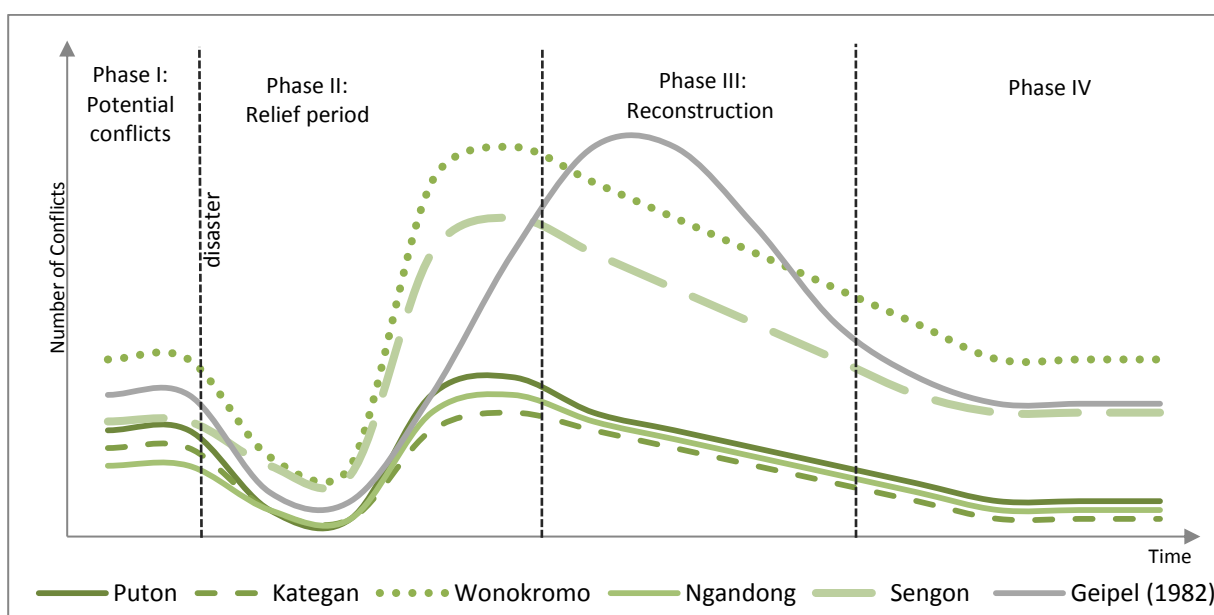
In contrast, symbolic gestures, particularly by government agencies, can contribute to long-term perceptions of recovery programming. One of the main issues associated with recovery perceptions in Yogyakarta involved the declaration shortly after the earthquake by Vice-President Jusuf Kalla that impacted households would receive RP 30 million (approx. \$3,200 USD). Once the extent of damage was realized, this number had to be lowered to RP 15 million (approx. \$1,600 USD). While the majority of households had heard the initial announcement, many were unaware that the

amount would be reduced and the reasons for this reduction. This contributed to significant feelings of distrust and social conflict in villages, as some households still believe they were supposed to receive RP 30 million and that the funding was significantly corrupted (HI 01-014; 01-022; 02-004; 05-016). Local government leaders were then responsible for explaining the funding conditions to villagers, which may have contributed to feelings of distrust and corruption, particularly in contexts where social conflicts were higher.

7.3.1.4 Conflict during the recovery period

Researchers have noted the changing nature of conflict during the post-disaster context. In the immediate aftermath of a disaster, collaboration, solidarity and mutual helping significantly reduces the number of conflicts, whereas the distribution of external aid and reconstruction assistance tends to greatly increase the number of conflicts (Barton, 1969). According to Geipel's (1982) Conflict Model of Recovery (see Figure 2.1), levels of conflict are at a maximum during the reconstruction planning phase, whereas the number of conflicts decreases throughout the recovery period as individuals and households become accustomed to new living conditions. While the recovery experiences in each of the case study villages after the Yogyakarta earthquake generally follow Geipel's model, there are some significant differences, as depicted in Figure 7.1. In this figure, the depiction of conflict curves was derived from a subjective interpretation of respondent comments as opposed to a quantitative assessment of number of conflicts.

Figure 7.1: Model of Conflicts during the 2006 Yogyakarta Earthquake



In the Yogyakarta recovery effort, levels of conflict were generally at a maximum during the relief phase, with villagers highlighting distribution of immediate assistance as a particular concern. This is contrary to the findings in Geipel's model, whereby conflicts were generally lower during the relief period, hitting a maximum at the beginning of reconstruction phases, particularly during the planning phase. In Yogyakarta, the number of conflicts during the relief period was attributable to two sources: degree of pre-existing potential conflicts, and strength of local leadership. In Wonokromo, the number of potential conflicts was greater in the pre-disaster period compared to the other four villages. The higher degree of conflict contributed to a greater number of conflicts during the relief phase, as villagers experienced a lower degree of social cohesion and increased tension over the distribution of relief assistance. Conflict continued during the reconstruction phase, as there were issues with corruption of house funding. In Sengon, a high degree of conflicts was attributed to high levels of corruption of assistance due to lack of political leadership. In Puton, Kategan and Ngandong, the ability of government and youth organizations to work together and distribute relief and assistance in a transparent and socially cohesive manner reduced the number of conflicts in these villages.

Differences between the temporal periods of maximum conflict in the Yogyakarta case study and Geipel's (1982) study of the 1976 Friuli earthquake may be a reflection of the different characteristics of the region impacted, as well as the implementation of a community-based reconstruction program in the Yogyakarta case. In Yogyakarta, the semi-rural nature of the impacted region meant that the majority of households were able to shelter-in-place, with low levels of displacement. The community-based reconstruction program meant that households had a greater degree of control over the reconstruction of their houses, leading to reduced social conflict during the planning phases of reconstruction. This suggests that the nature of conflict may be at least partially dependent on pre-existing conditions in the region, such as pre-existing levels of conflict and development characteristics, as well as the characteristics of recovery programming.

A final difference between the Conflict Model of Recovery highlighted in Figure 2.1 and the Yogyakarta experience highlighted in Figure 7.1 relates to the number of conflicts in Phase IV of recovery. In Geipel's (1982) conflict model, the number of conflicts is thought to decrease as individuals and households become accustomed to their new circumstances, implying a reduction in conflicts due to residents resigning themselves to the new circumstances. In Yogyakarta, the experience in three villages, Puton, Kategan, and Ngandong, suggests an alternative explanation. In

these three villages, the disaster and subsequent recovery period contributed to increased solidarity and mutual cooperation among villagers. Interview respondents highlighted the improved *gotong royong* conditions and reduced social conflicts due to the shared experiences of recovering from the disaster. This suggests the disaster and recovery program actually contributed to reducing the number of conflicts in the village, as opposed to villagers' first experiencing conflicts and then being resigned to their recovery conditions. This indicates that an effective recovery program, while acknowledging that some degree of conflict is inevitable, should contribute to a reduction in the number of conflicts and work to improve social solidarity.

Furthermore, the variations in conflict across the places experiencing recovery programming highlight the distinct spatial and social outcomes following a disaster event. Edgington's (2010) dual lenses of 'geography of crisis' and 'geography of opportunity' and evidence from the Yogyakarta recovery supports this notion. Recovery programming in Yogyakarta created spaces of ongoing crisis as well as spaces where the disaster acted as a catalyst for improving social conditions and overall community functioning. This supports McEntire's (2001) observation that the interaction between both the community and external recovery actors can work to perpetuate and further entrench vulnerabilities and conflicts, or lead to a reduction of these issues.

7.3.1.5 Major national programs

Barton's (1969) review of the recovery literature suggested that major national programs of recovery are required to supplant local responses and increase efficiency. In contrast, the Yogyakarta earthquake case study suggests that local governments were capable of implementing recovery programming, with the facilitation of NGO and national government support. This is similar to findings by Rubin, Saperstein, and Barbee (1985), who focused on political and government leadership capacity during the recovery (see Figure 2.2). The research results provide support for recognizing the role of other key actors, including local governments and communities themselves (as discussed above).

Berke, Kartez, & Wenger (1993) highlighted the impact of vertical and horizontal relationships on disaster recovery: these relationships reflect the capacity to organize and access resources on a variety of scales. This is supported by evidence from the Yogyakarta earthquake recovery, which highlighted the importance of both vertical and horizontal linkages. Individuals, households and communities with strong internal cohesion were able to implement a recovery program with lower

levels of social conflict, improved equitable distribution of assistance, and decreased costs of reconstruction through the use of *gotong royong*. External linkages to government and humanitarian organizations, as well as civil society also impacted recovery: those villages with greater external networks were able to translate these relationships into increased assistance and programming. This evidence highlights the importance of networks in facilitating a strong recovery after major disaster events.

The role of private and civil society elements represents a somewhat neglected area of humanitarian assistance. These linkages represented a strong component for recovery funding and support following the 2006 Yogyakarta earthquake, including cash and in-kind donations, fundraising, emotional and psychological support, and labouring assistance (E-06). Taking advantage of the strength of civil society to develop informal partnerships and coordination for responding to small- and large-scale hazardous events is an area that requires further exploration (E-07). Particularly in the context of developing countries where insurance programs remain largely non-existent, civil society partnerships represent an opportunity for risk-pooling and resource-sharing (E-01; E-09; E-15). A further component of civil society involves the sharing of knowledge, particularly between the educated who can work as community volunteers in order to facilitate improvements in welfare and standards of living. An example of this type of volunteer-based community involvement is in Puton, whereby *Ibu X* works within a network of community volunteers in order to facilitate the development of one particular village (CM-01; FG-01). This type of informal community network and development program could be implemented on a larger scale through informal civil society networks in order to increase overall welfare and standards of living and contribute to increased resilience.

7.3.1.6 Summary of recovery literature

The data from the 2006 Yogyakarta earthquake suggests a shift away from the traditional understandings of recovery and reconstruction following major disasters. Contrary to previous research on disaster recovery in developing countries, governance capacity in Indonesia reflected a relatively strong ability to implement programming using local government organizations and human resources, providing the government with the major role of reconstruction and recovery. In the Yogyakarta case study, local capacity was not overwhelmed after the disaster, and coordination agencies worked in conjunction with local governments. While humanitarian organizations were involved in the recovery effort, the role was secondary compared to the recovery efforts of the

government. The implementation of a coordinated humanitarian response under the UN cluster system led to decreases in competition and increasing efficiencies of aid distribution. Certain humanitarian organizations have also engaged in a shift towards a facilitation role, whereby the primary role is one of knowledge transfer and the responsibility for implementation is given to local organizations. Furthermore, the role of civil society and the private sector was highlighted, with suggestions for how this could contribute to improved development and implement unique strategies for spreading risk.

The research also contributed to increased understanding of the nature of conflict in the post-disaster period, with emphasis on the influence of pre-existing social conditions as well as the characteristics of recovery programming. The importance of understanding pre-existing conditions in the disaster-impacted region was highlighted: the capacity of governance systems to implement recovery programming will influence the role of humanitarian organizations and impact the characteristics of recovery programming. The nature of recovery is also highly dependent on the damages experienced, particularly human damages and social capital linkages. This suggests that even communities with strong governance and social structures could be overwhelmed with recovery due to heavy disaster impacts.

These results also contradict the findings of Haas, Kates, and Bowden (1977) who argued that disaster recovery is “ordered, knowable and predictable” (p. xxvi). Although the statement references the distinct phases of recovery programming, the implication is that the speed and characteristics of physical, economic, social and cultural recovery is homogenous and consistent throughout impacted populations. The results from this case study indicate that recovery is not homogenous: recovery occurs at different rates depending on pre-existing capacities and conditions, and there are variations in the outcomes of recovery across different places. Similar to criticisms from Berke, Kartez, & Wenger (1993), Rubin, Saperstein, & Barbee (1985), and Schwab (1998), the four linear phases of recovery described by Haas, Kates, & Bowden (1977) were not necessarily clear or distinct in the Yogyakarta example. The distinction between the emergency and restoration period was rather blurred, with emergency and restoration activities occurring almost simultaneously. For many households, economic activities have yet to return to pre-disaster levels, although commemorative activities, such as the earthquake monument, have been completed. This implies that the four phases of recovery described in the disaster recovery model in section 2.1.1 are neither distinct, nor linear.

7.3.2 *Vulnerability, Resilience and Sustainable Livelihoods Concepts*

While section 7.2 highlighted the importance of incorporating vulnerability, resilience and sustainable livelihoods concepts in recovery assessments, each of these concepts was expressed individually. In order to effectively integrate and understand the relationships between each of these concepts, further understanding of the interactions between them is required. While the literature review highlighted the interconnections between vulnerability and sustainable livelihoods, particularly highlighted through the Access model outlined in chapter two, the relationship between vulnerability and resilience, as well as resilience and livelihoods was less clear. The following section provides an overview of the contributions to further understanding of the relationships between these concepts, and how this can lead to a more complete integration of these concepts in the framing of resilient disaster recovery.

7.3.2.1 *Vulnerability and resilience*

The results demonstrated that the relationship between vulnerability and resilience is neither linear, nor simple: in fact, in this research the relationship was found to be more complex than originally anticipated. Various attributes of vulnerability had both positive and negative feedbacks on aspects of resilience. For example, while most villages had a strong belief in God and religious faith, in Wonokromo this translated into a higher degree of social connections and increased aid, as well as providing strength for recovery and working towards improving living conditions. In other villages, while strong religious faith provided strength for recovery, it also contributed to religious fatalism, and a lack of initiative to prepare for future disasters. This paradoxical relationship was seen in other areas, such as levels of experience and strength of government institutions. Table 7.1 provides an overview of how some factors or indicators may contribute to both vulnerability and resilience.

Table 7.1: Relationship between Vulnerability and Resilience Attributes

Attributes	Vulnerability	Resilience
Religion	A strong belief in God and religious faith may contribute to vulnerability through the belief that disasters are God’s plan, God would take care of them, and thereby limiting the need for any preparedness actions to face hazards	A strong belief in God and religious faith appeared to contribute to resilience through increased social awareness, attempts to aid others in the community, bringing the community together, providing strength for recovery
Culture	Cultural beliefs may limit need for disaster preparedness activities, and decision-making structures that limit the capacity of	Cultural beliefs may lead to acceptance and gratefulness, improving psychological capacity for recovery

	poorer households to engage with governments	
Strength of leadership	Competing leaders can lead to increased social conflict among followers, and difficulty with program implementation	Strong and respected leaders can push forth progressive programming to improve welfare and standards of living, as well as obtain further resources to support recovery
Experience with disasters	May lead to belief in capacity to respond to all future disasters (regardless of scale), limiting desire to engage in adaptive or preparedness activities	Experience with disasters builds capacity to respond and organize
Strength of government institutions	Strong government institutions may reduce response capacity at the individual, household or community level and contribute to dependency on external support	Strong response and organizational capacity can support improved response and quicker recovery

The above table indicates that the relationship between vulnerability and resilience is difficult to define and may be highly dependent on context. This supports the relationship framework set forth in chapter two, Figure 2.6, whereby resilience and vulnerability are conceptualized as distinct concepts represented along two continuums. While vulnerability and resilience are distinguished as separate concepts, the relationship is viewed as complex and highly interrelated. The X-Y conceptualization suggested that it is possible for individuals, households, and communities to have characteristics of high vulnerability as well as high resilience. Approaching the relationship as two separate concepts explicitly recognizes that even though affected populations may experience some forms of high vulnerability, they also have other forms of resilience to support recovery.

The results from the case study research support the use of the hypothetical communities outlined in Figure 2.6. In the case of Puton village, households experienced high vulnerability through poor housing construction, low income levels and low levels of education, while recovery was facilitated through high levels of resilience. These resiliencies took the form of construction skills, community organizational capacity, and cultural capitals that contributed to sharing of resources and mutual cooperation. Puton also demonstrated adaptive capacity, learning and transformation through the use of social capital networks to support the implementation of a strategic five-year development plan. This suggests that appropriate and timely assistance can be used in conjunction with existing resiliencies in order to facilitate adaptation and transformation, resulting in improvements to overall welfare and living conditions. Thus, Puton represents an example of a village with high levels of both vulnerability and resilience. Conversely, the experience in Katagan represents villages with high vulnerability and low resilience. Vulnerability factors were similar to

Puton, although there was a lack of social capital networks and capacity to implement learning and transformations within the community. Accordingly, the relationship between vulnerability and resilience can be understood as highly contextual and dynamic, and varies significantly with the type of disaster and associated damages.

7.3.2.2 Resilience and sustainable livelihoods

In the RDR-AF conceptual model, the relationship between resilience and sustainable livelihoods remained undefined. This was consistent with the lack of consensus in the hazards literature in defining the relationship between these two concepts. In some cases, responses to hazards have made the assumption that hazard resilience and sustainability are mutually exclusive, particularly when focusing on building standards (Kijewski-Correa & Taflanidis, 2012). On the other hand, concepts of resilience may imply sustainability, as the ability to absorb, recover quickly and adapt to changing natural and human processes indicates a capacity to effectively respond to external stresses and shocks (Derissen, Quaas, & Baumgartner, 2009). This suggests that the concepts of resilience and sustainable livelihoods are mutually reinforcing; particularly, the research indicated that capacity to adapt to shocks and stresses has been useful for enhancing livelihood diversification and security (Motsholapheko, Kgathi, & Vanderpost, 2011). This contradicts the work of Common and Perrings (1992) and Levin, et al. (1998) who defined the relationship between resilience and sustainability as interchangeable, suggesting a high degree of similarity.

In the context of hazards and disaster recovery, it is important to understand whether resilience contributes to sustainable livelihoods, and vice versa, at the individual, household and community level. The definition of sustainable livelihoods used for this research explicitly states that “a livelihood is sustainable when it can cope with and recover from stresses and shocks” (DFID, 1999, p. 1). This implies that a livelihood that is sustainable is also resilient: the livelihood strategy can absorb the impact and recover quickly from external pressures. From this understanding, the relationship between resilience and sustainable livelihoods is viewed as interactive and mutually reinforcing (Gwimbi, 2009).

Applying this definition to the Yogyakarta case study indicates that this approach may not provide the whole story. Farming labourers in Yogyakarta province experienced limited impacts on their livelihoods due to small damages to irrigation and agricultural systems, and their livelihood activities were recommenced shortly after the earthquake. The low-input, low-output agricultural

system might suggest a high degree of sustainability and some resilience to highly damaging events such as earthquakes. Conversely, farming labourers represent one of the poorest groups in the case study villages, with limited human and financial capital assets, and low ability to recuperate, adapt and transform following the earthquake (indicative of low resilience). Low income levels also led to a poor capacity to rebuild housing without external assistance, and a decreased capacity to access of variety of resources, including health and education services. From a poverty and well-being perspective, farming labourers would not necessarily be classified as having 'sustainable livelihoods'. This suggests there is more to the sustainable livelihoods concept than capacity to absorb the impact of stresses and shocks.

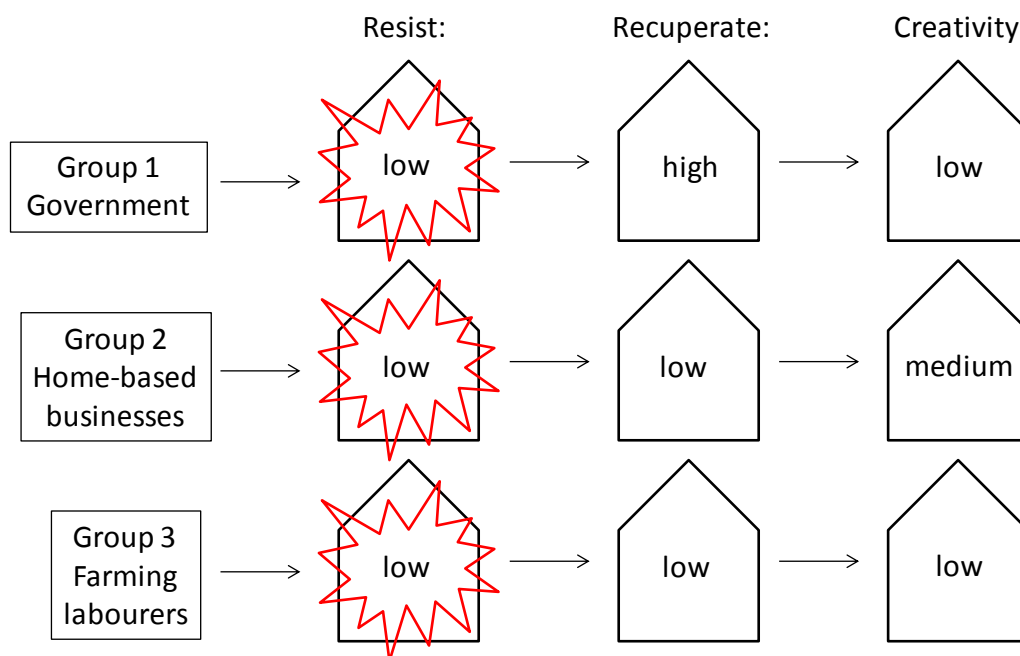
In order to further explore the relationship between these two concepts, an example of three different population groups, divided by their livelihood activities, is provided. The first group (group 1) involves those individuals and households, both male and female, engaged in public sector employment, including government officials, teachers, as well as those involved in religious organizations. This particular group has a tendency towards higher income levels, increased standards of living and higher levels of well-being compared to the other two groups. The second group (group 2) includes those individuals and households involved in home-based economic activities, both male and female. This group includes a range of income levels, although overall standards of living and levels of well-being are quite good in the village context. The third group (group 3) examines the livelihoods and levels of resilience of farming labourers discussed above. This group is often comprised of women, although a number of men also work as farming labourers. As noted, these labourers typically represent the poorest, least educated villagers and have some of the lowest standards of living in the village. Assuming similar quality of construction of housing among the three groups, the post-disaster experience provides insight on the relationship between livelihoods and resilience, as depicted in Figure 7.2.

Following the earthquake, all three groups experienced similar levels of damage to housing although the impact this had on livelihoods differed. Groups one and three were able to recommence their livelihood activities almost immediately, due to the continued need for the provision of their livelihood services²⁶. On the other hand, group two had greater difficulty continuing their livelihood activities due to the destruction of the buildings in which production

²⁶ In some cases, farming labourers did not resume their livelihood activities for three to four months following the earthquake. This was due to the fact that the harvest had been reaped immediately prior to the earthquake, and many impacted households missed the seeding time due to their focus on building temporary and permanent shelters. Hence, many farming labourers began working during the following planting season.

took place as well as damages to production tools. Hence, group two most likely experienced greater livelihood impacts following the earthquake due to the loss of their shelter assets as well as their employment and productive assets.

Figure 7.2: Sustainable Livelihoods and Resilience between Three Groups



When examining resilience levels between the groups, all groups exhibited similarly low levels of resistance resilience: there was limited capacity to absorb the impacts of the earthquake due to poor quality of housing construction, although this impacted livelihood activities differently, as noted above. Examining recuperation resilience, group one was able to recuperate more rapidly due to higher income levels and stability of income. Group two's capacity to recuperate quickly was reduced due to damages to income generating activities. Group three's capacity to recuperate quickly was quite low, although this was specifically due to low income levels and lack of access to capital assets and savings, as opposed to damages to income generating sources.

In terms of creativity, all groups experienced positive transformations in the form of earthquake resistant housing, although this was the result of external pressures and assistance from government and NGO sources. While group one had limited need for adaptation and increasing the functioning of their livelihood activities, some of the households in group two were able to improve and increase their business activities by taking advantage of the resources provided during the recovery period. Thus, some households in group two exhibited a higher degree of creative

resilience than group one, indicating the importance of agency, although this was not consistent throughout the group. Group three was unable to take advantage of resources and programming during the recovery period due to low levels of capital access, thus exhibiting the lowest capacity to adapt and transform. This is indicative of the importance of access to sustainable livelihood assets in facilitating various forms of resilience.

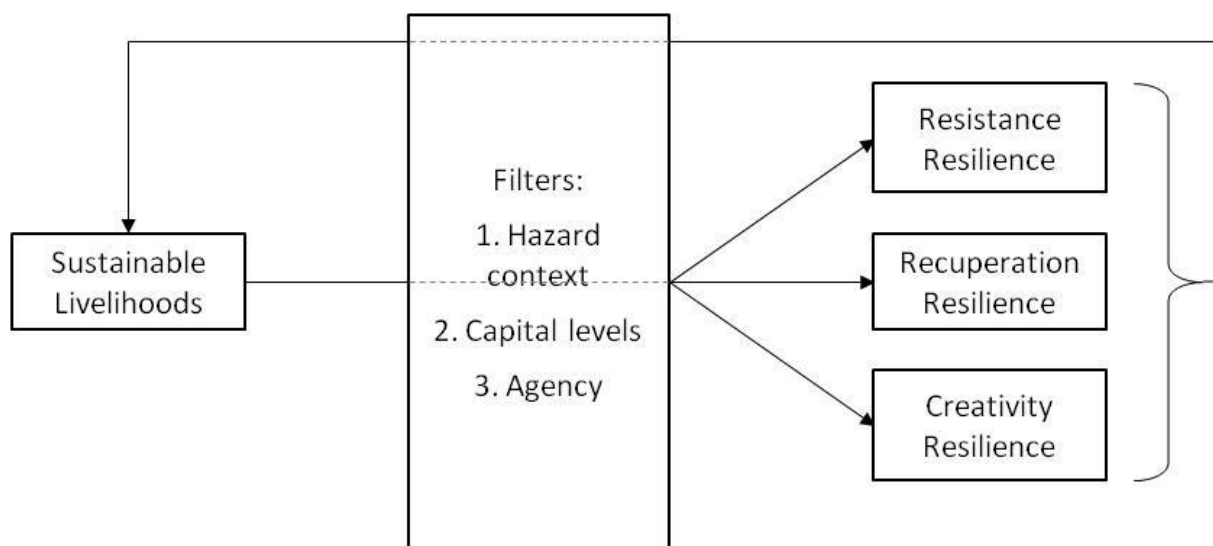
The group examples provide an indication of the complex and multi-faceted nature of the relationship between resilience and sustainable livelihoods. Although group one could be defined as having a sustainable livelihood due to the economic capacity to absorb the impact of external shocks, as well as overall livelihood contributions to well-being and increased access to assets, it would be difficult to classify this group as fully resilient due to the high degree of impacts experienced from the earthquake. Increased levels of access, assets and well-being did not necessarily translate into increased capacity to absorb the impacts of the earthquake: housing of both the poor and wealthier was destroyed, and productive tools and assets were lost. This would suggest that sustainability of livelihoods does not necessarily contribute directly to all forms of resilience: in fact, concentrating on sustaining the economic outputs associated with livelihood activities may actually contribute to decreased resilience through the elimination of redundancies and buffering components of the system (Dearden & Mitchell, 2012; Walker & Salt, 2006). While recuperation and creativity aspects of resilience were significantly impacted by sustainability of livelihood activities, perception of hazard risk and individual-decision making impacted the degree to which households used income and access to assets to improve their capacity to absorb impacts of hazards. This suggests that in order for sustainable livelihoods to contribute to increased resilience, particularly the capacity to resist, individuals, households and communities must engage in deliberate actions to use the financial benefits derived from successful livelihood strategies to reduce risk and build resilience to future disasters.

Exploring the relationship between resilience and sustainable livelihoods using the same group examples, the mutually reinforcing nature of the interactions between the two concepts is slightly clearer. As noted above, resilience involves the capacity to absorb the impacts and recover quickly from disasters, as well the ability to adapt and transform. This holistic approach implies that these capacities would translate into a greater sustainability of livelihood activities. Evidence from the example provided above supports this assertion: if all groups had exhibited resistance resilience, the earthquake would have resulted in limited impacts on all livelihood activities, leading to

increased capacity to recover (due to lower damages), particularly for groups two and three. The mutually reinforcing nature of resilience and sustainable livelihoods is highlighted through the recuperation and creativity resilience: the capacity to recuperate quickly, adapt and transform was heavily influenced by higher capitals levels. This suggests that those persons who exhibited characteristics of resilience would also exhibit strong characteristics of sustainable livelihoods and vice versa.

Overall, the relationship between resilience and sustainable livelihoods is summarized in Figure 7.3. In the diagram, resilience is seen as a critical factor for livelihood sustainability, as is sustainable livelihoods for resilience (Osbaahr, 2007). Yet the relationship linkages between these concepts are filtered through three key factors, including the hazard context (type of hazard, damages, etc.), quality of capital levels, as well as individual agency.

Figure 7.3: Relationship between Resilience and Sustainable Livelihoods



Although access to capitals should be considered part of the sustainable livelihoods concept, in this case, the influence capital levels had on resilience was seen as significant, and hence, this is highlighted in the diagram. In this instance, sustainable livelihoods contribute to the various forms of resilience, although the nature of this contribution is dependent on the characteristics of the disaster and the nature of impacts experienced. In certain cases, households must also engage in deliberate actions that contribute to risk reduction (i.e. investing in earthquake resistant housing construction, investing income in savings etc.) in order to contribute to resilience, which necessitates the inclusion of agency. Thus, similar to the relationship between vulnerability and

resilience, the results from this research suggest a relationship complexity influenced by agency and context. Although the relationship is influenced and filtered through three key factors, the diagram suggests a variety of overlap, highlighting the intersections and mutually reinforcing nature of the relationship between resilience and sustainable livelihoods.

7.3.3 Re-conceptualizing Resilient Disaster Recovery as a Process

In order to integrate vulnerability, resilience and sustainable livelihoods concepts with the knowledge gained about disaster recovery from the research results, this section provides a revised conceptualization of resilient disaster recovery. The revised conceptualization particularly highlights how disaster recovery can be understood as an ongoing process. Beginning with an overview of how disaster recovery can be understood as a process, the section culminates with the revised conceptualization of resilient disaster recovery.

The research results highlighted how the process of recovery involves not only physical reconstruction, but also intangible elements, such as the process of decision-making, governance capacity and infrastructure, psychological healing, and establishing new social connections (Kenny, et al., 2010; Mileti, 1999). The research also highlighted how the recovery process itself is heavily influenced by pre-disaster conditions, customs and policies of the impacted area, and as such, offers a complexity rarely found in the other three stages of disaster management (Schilderman, 2010). The complexity was emphasized through the diverse recovery experiences from the five case study villages. Recovery of impacted areas was rarely uniform and homogenous; there was a spatial component to patterns of recovery that were impacted by both pre-existing conditions as well as the politicized processes of providing assistance and reconstruction (Edgington, 2010). From this perspective, disaster recovery can be understood as a multi-dimensional process occurring differently in different places and among different groups, and encompasses a wide-range of activities (Samuels, 2010).

While many historical definitions of disaster recovery focus on returning individuals and communities to ‘normal’ conditions, the research indicated that communities rarely return to pre-disaster form. The passing of time and the disaster experience results in changes and shifts in the community and even ways of thinking:

Returning to a previous situation is never possible in any case, because it is important to consider the impact of time. The passing of time from the point of

origin to the point of reconstruction means that it is not possible to recreate the starting point. Rather than moving along a circle, the impact of time produces a result similar to that of a corkscrew...thus the reconstruction...has required the construction of new concepts of 'normal' (Kenny, et al., 2010, p. 14).

Thus, it can be argued that there is difficulty differentiating between 'normal' conditions and the recovery process itself. As impacted communities begin reconstruction and rehabilitation activities, a new understanding and meaning of 'normal' is continuously remade and reworked throughout this process (Ride & Bretherton, 2011). This indicates that while the disaster event results in significant shifts and changes within the community, the process of recovering also has an impact on the community.

Consequently, disaster recovery should be viewed not only as the process of reconstruction and rehabilitation, but also as process that can have significant impacts on the social landscape of impacted communities. Particularly in the housing sector, the reconstruction program resulted in social, cultural, and familial transformations. There was a shift away from traditional housing styles and separation of multi-generational family compounds. Although this was highlighted as a positive trend, this resulted in social and cultural changes within the community, both presently and perhaps in the future. The cement and iron construction materials were also regarded positively by villagers as these housing styles were generally seen as more modern and of a higher social standing than traditional bamboo housing. In this manner, the recovery program itself has resulted in cultural, political, economic and social shifts within disaster-impacted communities.

There are a variety of stakeholders and actors involved in the recovery process; although previous recovery literature has focused on the role of humanitarian organizations, this understanding downplays the role of local communities who may be actively engaged in their own recovery (Ride & Bretherton, 2011). As these communities engaged with the recovery effort, there are further changes and shifts in organizational and capacity levels. Another important consideration is that the involvement of external organizations leads to the development of a new sense of 'normal' as assistance and aid permeates through affected communities. Once these government and humanitarian organizations complete their recovery activities, a new adjustment phase occurs as residents become accustomed to everyday living conditions without the assistance previously provided by external organizations. During this new adjustment period, affected communities develop another sense of 'normal' and become re-accustomed to everyday life without external assistance (Samuels, 2010). Although many definitions of long-term recovery focus exclusively on

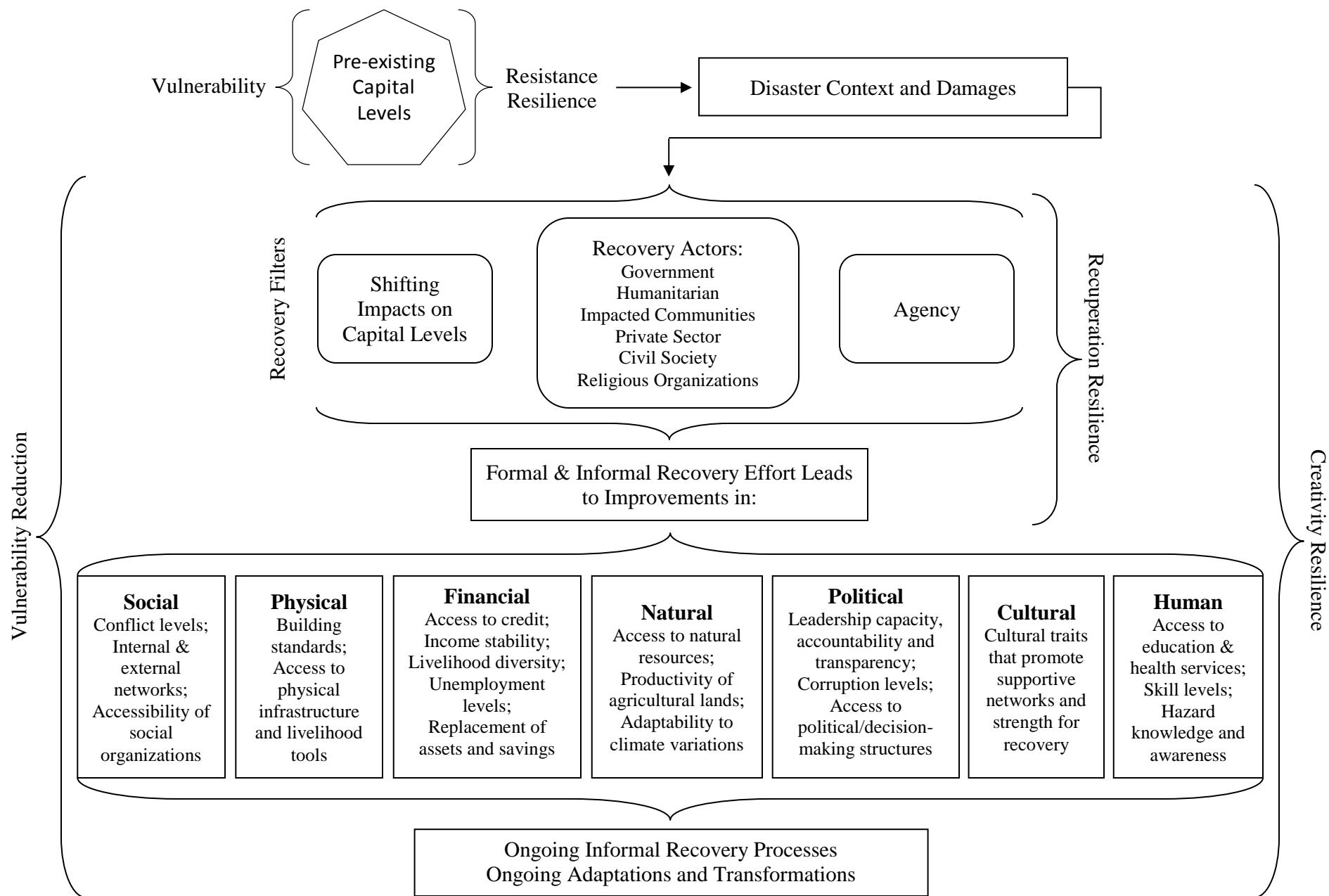
the period in which external assistance is provided, the research findings suggest recovery continues even after humanitarian organizations have completed their reconstruction activities.

In order to conceptualize resilient disaster recovery as a multi-dimensional and dynamic process, as well as integrate recovery knowledge and theory, Figure 7.4 depicts the refined understanding of resilient disaster recovery. The Resilient Disaster Recovery Model provides a conceptualization of what effective ‘resilient disaster recovery’ would look like. This approach synthesizes key information from the vulnerability, resilience and sustainable livelihoods literature, as well as the knowledge gained from the research regarding long-term disaster recovery. This conceptualization focuses on exploring the positive impacts on capital levels as they are transformed through the resilient disaster recovery process. As no scale for this conceptualization is identified, this model could be applicable at the household, community and regional levels.

From this conceptualization of the process of resilient disaster recovery, the pre-existing conditions of resilience, vulnerability and sustainable livelihoods capital levels (including all seven capital levels noted in the RDR-AF) are impacted by the characteristics of the disaster and damages context. The process of recovery, both formal and informal, is influenced by three key recovery filters, including the variety of recovery actors involved, the impacts the disaster had on access to the seven livelihood capitals, as well as individual, household and community agency.

Recovery programming is implemented through the partnerships and interactions between a variety of actors, including governments, humanitarian and religious organizations, impacted communities, as well as the private sector and civil society. The roles and responsibilities of each of these actors will vary depending on the pre-existing conditions and nature of the disaster event, as well as the characteristics and structure of recovery programming. Particularly, this highlights the role of local community involvement in the recovery process, with the majority of actors involved specific to the place of the disaster. Thus, the specific conditions and roles of the various actors will also be dependent on local conditions, and vary from place to place.

Figure 7.4: Resilient Disaster Recovery Model



The disaster impacts on the seven capital levels will influence the recovery process as well. The new capital levels reflect the capacity of different actors to implement and take advantage of recovery strategies, thereby impacting the execution of formal and informal recovery programming and funding. This also emphasizes the dynamic nature of recovery; during the recovery period, the level of various capitals is in a constant state of flux, as the process of recovery is constantly shifting and specific recovery needs change. In this sense, the contributions of different capital levels will change across the different components and temporal periods of recovery. An example of this is with the changing levels of resilience and vulnerability levels of construction labourers within the Yogyakarta context. While construction labourers were generally low-paid workers, with unstable and unreliable income, and thereby high levels of vulnerability, during the reconstruction period, the access to construction skills allowed for a community-based reconstruction program that enhanced recuperation resilience. Following the reconstruction effort, many of these construction labourers suffered from high unemployment levels, unstable income and resulting lack of access to a variety of assets. This demonstrates the dynamic nature of vulnerability and resilience during recovery periods, and highlights how capital levels can be more valuable in certain contexts than others.

Furthermore, formal and informal recovery programming is influenced by individual, household and community agency. Decision-making processes, particularly regarding choices in relation to housing construction standards, livelihood choices, and participation in community organizational activities, impact the recovery process and capacity to implement adaptations and transformations during the recovery period. The conceptualization of resilient disaster recovery would hypothesize that individuals, households and communities would implement choices and strategies in order to reduce risk to future disasters, reduce vulnerability and enhance resilience, although it is recognized that this may not always be the case in the real-world.

Throughout this period of formal recovery programming, the conceptualization of resilient disaster recovery highlights that vulnerability reduction should form a key component of recovery strategies. Furthermore, recuperation and creativity resilience occurs during this period, with the recovery programming acting as a catalyst for improvements in resilience levels. This results in a series of encouraging transformations and adaptations within the community, particularly highlighted through improvements in access to a variety of assets within the seven livelihood

capitals. These improvements in capital access should result in overall reductions in vulnerability, as well as increased capacity to absorb the impacts of future disaster events.

Once the formal recovery effort is complete and the various organizations conclude their funding and recovery programs, impacted households and communities shift into a new state of capital levels, reflective of the successes of the recovery programming. While formal recovery programming is complete, ongoing informal recovery continues, with a series of adaptations and transformations continuing to occur within households and communities. This model of resilient disaster recovery explicitly recognizes that impacted areas do not return to pre-disaster form, instead transforming into a new state, although it is recognized that this is a dynamic process. Thus, it must be mentioned that the depiction of post-recovery capital levels is not meant to imply that capital levels return to a static level once recovery programming is completed. Rather, the model suggests that there has been a shift in the forms of vulnerabilities and resiliencies associated with each capital compared to pre-disaster conditions. Furthermore, the model explicitly recognizes that informal recovery and ongoing transformations occur following the completion of formal recovery activities, suggesting the long-term nature of recovery as a process.

Through this refined conceptualization, resilient disaster recovery can be defined as:

The ongoing period of short- and long-term recovery, both formal and informal, that contributes to the interrelated processes of vulnerability reduction, increased access to relevant livelihood capitals, and improved capacity to absorb, cope and learn from hazardous events.

The resilient disaster recovery approach recognizes that the processes of vulnerability reduction and resilience building are highly interrelated, although complex, and thus, individuals and communities will have differing optimal zones between vulnerability reduction, resilience building and increased access to assets. Defining the recovery process specifically through a resilience lens acknowledges that people are inherently resilient, and that different forms of resilience can be found in all societies (Ride & Bretherton, 2011). The resilience approach also recognizes that “at the heart of resilience thinking is a very simple notion – things change – and to ignore or resist this change is to increase our vulnerability and forego emerging opportunities” (Walker & Salt, 2006, pp. 9-10). Summary and Conclusion

This chapter has highlighted the empirical, methodological and conceptual contributions of the research. The empirical evidence under the RDR-AF model suggested that the recovery program

after the 2006 Yogyakarta earthquake contributed to reductions in the visible manifestations of some forms of vulnerability, although there was limited impact on dynamic pressures and root causes. An analysis of the humanitarian response system determined that many organizations are not designed or structured to implement the type of long-term programming required to effectively address underlying vulnerability issues. This meant that much of the programming, particularly livelihood programming, was relatively ineffective, and in the unique words of one villager: “a wasting time” (HI 03-007).

The methodological contributions highlighted the RDR-AF model as an effective framework for evaluating post-disaster recovery operations. The framework allowed for a holistic analysis focusing on the concepts of vulnerability, resilience and sustainable livelihoods. Using the RDR-AF approach offered a new evaluative tool whereby recovery programming and outcomes were compared to an idealized conceptualization of resilient disaster recovery. This provided an opportunity to understand missed opportunities in recovery programming, as well as taking a multi-scalar and participatory approach to data collection. Challenges were also identified, many of which are common to all types of methodological approaches for evaluating recovery programming. A lack of baseline data to make comparisons to pre-disaster conditions as well as difficulty in establishing causal relationships between specific programs and community outcomes were identified as research challenges. Furthermore, the large amount of data required to satisfy the information needs set forth by the model indicates a large time commitment on the part of researchers and participants. Thus, a standardized household interview strategy was recommended for longitudinal approaches to assessing recovery.

The discussion chapter also summarized the conceptual contributions of the research. Beginning with a summary of how the research results contributed to further understanding of disaster recovery knowledge, including the role of governments, humanitarian organizations and civil society, and the nature of conflict in the post-disaster period. The relationship between concepts of vulnerability and resilience, as well as resilience and sustainable livelihoods was also reviewed. The results provided support for conceptualizing vulnerability and resilience as separate concepts, but highlighted the interconnections between the two concepts. The complex relationship between resilience and sustainable livelihoods was also discussed, although the mutually reinforcing nature of these concepts was emphasized.

Finally, the knowledge obtained from the research contributed to a revised and refined conceptualization of resilient disaster recovery. The revised conceptualization incorporated a more nuanced understanding of the integration between vulnerability, resilience and sustainable livelihoods concepts as well as disaster recovery processes. Resilient disaster recovery was conceptualized as a complex process with a variety of actors, although specific outcomes focused on reduced vulnerability, increased resilience, and improved access to sustainable livelihoods capitals. Furthermore, the dynamic nature of vulnerability, resilience and sustainable livelihoods was highlighted, explicitly recognizing recovery as an ongoing process that leads to a shifts and changes in the landscape of disaster affected communities.

8.0 CONCLUSION

This research set out to conceptualize resilient disaster recovery and utilize the concept as a framework to evaluate and assess long-term disaster recovery. Through this process, the research provided data to enhance the conceptualization of resilient disaster recovery as a process, as well as contributing to empirical evidence of a long-term disaster recovery effort. The ensuing chapter highlights how the results responded to the research questions set forth in the introductory chapter. This is followed by a series of recommendations regarding the implementation of disaster recovery initiatives, as well as an overview of areas where further research is required.

8.1 Responding to the Research Questions

The following section highlights how the results and discussion chapters responded to the research questions set forth in the introduction of this dissertation. Within each of these sections, the findings for each question are summarized, followed by an overview of how these results contribute to the concept of resilient disaster recovery as well as the disaster recovery literature overall.

8.1.1 *Question One: Evaluating the 2006 Yogyakarta Earthquake Recovery*

The first research question related to the evaluation and assessment of one disaster recovery effort. As noted in chapters one and two, research on disaster recovery has been limited, and there has been a lack of empirical assessments focusing on holistic understanding of long-term recovery initiatives (Barton, 1969; Coppola, 2007; Edgington, 2010; Lloyd-Jones, 2006). Through a comprehensive assessment of the 2006 Yogyakarta recovery effort, this research contributed to further understanding of long-term recovery processes. Furthermore, much needed empirical evidence was provided, focusing on the contributions of government and humanitarian recovery programming in reducing vulnerability, building resilience and increasing livelihood opportunities.

Using the RDR-AF model, the assessment of the 2006 Yogyakarta earthquake found that the recovery programming did not achieve the goal of resilient disaster recovery. While recovery programming contributed to reductions in visible manifestations of vulnerability through improvements in quality of building construction, and increased awareness of hazards and earthquake-resistant building standards, the root causes of vulnerability were not addressed, and many villagers suffer from ongoing lack of access to assets and resources. While resilience to

future disasters has been improved in some forms (i.e. housing strength, improved disaster management structures and social capital networks), resilience in other forms (i.e. savings and financial capital, economic conditions) has decreased due to the strain of recovery from the 2006 earthquake. Moreover, many aspects of vulnerability and resilience have remained the same, including human capital and access to services. The research also found that livelihood initiatives were largely ineffective as villagers lacked appropriate skills, networks and linkages to be able to connect with markets. Ongoing issues with environmental change and degradation have heavily impacted vulnerability levels in some villages, particularly in Klaten.

On the other hand, successful livelihood initiatives in Puton provided evidence to support the notion that disasters provide a ‘window of opportunity’ to implement developmental changes to decrease vulnerability and increase resilience to future disaster events. In order to achieve this objective, recovery programming needs to take a long-term, holistic and diverse approach that recognizes the strengths and weaknesses of local capacities and engages the community in their own recovery. Unfortunately, the results indicate that the humanitarian response system is not effectively structured to take advantage of the opportunities provided by disaster events. This suggests major structural changes are required before resilient disaster recovery approaches can be implemented on the ground level.

8.1.2 Question Two: Resilient Disaster Recovery as an Assessment Framework

The second research question explored the extent to which the Resilient Disaster Recovery Assessment Framework was an effective tool for evaluating long-term recovery programming. The RDR-AF was found to be a successful method for evaluating recovery efforts through the integration of vulnerability, resilience and sustainable livelihoods concepts. This approach goes beyond traditional methods for evaluating humanitarian and development programming by setting forth a conceptualization of what resilient disaster recovery would look like: compared to conventional approaches where the focus is on evaluating objectives within the context of specific programs, the RDR-AF offers an opportunity to compare the impacts of the recovery programming to an idealized understanding of what effective recovery could accomplish. Moreover, the RDR-AF approach highlights long-term evaluation of recovery initiatives, focusing specifically on the sustainability of recovery programming once supportive structures have been removed. This also emphasized initiatives that target the root causes of vulnerability as opposed to visible

manifestations of risk. The RDR-AF approach offers an important contribution through the development of a holistic evaluation framework that can be applied to the post-disaster setting.

Additionally, the use of the three concepts of vulnerability, resilience and sustainable livelihoods were found to each be important contributions to the model of resilient disaster recovery. The integration of three key concepts from the hazards and development literature provided a comprehensive approach allowing for a holistic understanding of the needs and conditions of impacted villagers. The results of the assessment and analysis of the 2006 Yogyakarta recovery effort highlighted how the RDR-AF model was an effective conceptualization of resilient disaster recovery and allowed for a holistic understanding of disaster recovery processes.

The research contributed to further understanding and refinement of the inter-relationships between the three concepts, specifically between concepts of vulnerability and resilience, as well as resilience and sustainable livelihoods. In terms of the linkages between vulnerability and resilience, the results supported the use of two X-Y continuums that form a quadrant, as highlighted in Figure 2.6. The complexity of the relationship was highlighted through a discussion of variables and factors that could contribute to both increased vulnerability and increased resilience. The relationship between resilience and sustainable livelihoods was also found to be multifaceted and complex. The mutually reinforcing nature of sustainable livelihoods and resilience was highlighted, although it was recognized that the nature of the relationship would be filtered through the specific context of disaster damages, capital levels and agency processes. This provided an important contribution to further understanding on the relationships and interconnections between the three concepts used to form the conceptualization of resilient disaster recovery.

8.1.3 Question Three: Contributions to Recovery Theory and Literature

The third research question involved using the evidence from the 2006 Yogyakarta earthquake recovery programming in order to inform and contribute to further understanding of disaster recovery. Of all the phases of the disaster cycle, recovery has been the least well researched and the poorest understood (Barton, 1969; Coppola, 2007; Edgington, 2010). The current literature on disaster recovery was reviewed in chapter two, and the evidence from this research was used to either support or contribute to further understanding of current knowledge.

The findings associated with disaster recovery theory indicate that some of the current knowledge was reflected in the case study: particularly, public responses to disaster events were driven by both rational and symbolic assessments of government and humanitarian responses. Additionally, further understanding of recovery processes was highlighted: the evidence suggested that recovery is highly contextual and dependent on local customs and capacities, as well as the characteristics of the hazard and associated impacts. The capacity of local governments to respond to the disaster and the role of humanitarian organizations was influenced by pre-existing conditions as well as the nature of disaster impacts. This implied that there is difficulty in making generalized statements regarding the characteristics of all recovery programming; instead, the characteristics of recovery are highly dependent on place and context.

The research also contributed to new knowledge in the area of disaster recovery. The role of civil society and the private sector was highlighted as a strong arena for recovery processes which have generally been neglected by humanitarian organizations and by previous research. The impact of recovery on conflicts was highlighted as both a process of pre-existing conditions, as well as the successful implementation of community-driven reconstruction programs. In this way, the recovery process itself acted as a catalyst for reducing social conflicts and animosities in some villages. In other villages, similar to the results found in Geipel's (1982) study, the nature of pre-existing conflict and the recovery programming did not contribute to reduction in conflicts, instead, the disaster acted as a catalyst to further entrench social frictions. These findings were used to refine the understanding and conceptualization of resilient disaster recovery.

8.1.4 Question Four: Conceptualizing Resilient Disaster Recovery

Finally, the research provided a refined conceptualization of resilient disaster recovery derived from both the literature as well as empirical evidence from the research. This contributed to further understanding of resilient disaster recovery as a process, highlighting the impacts on vulnerabilities and resiliencies associated with the seven livelihood capitals. The conceptualization of resilient disaster recovery as a process depicted how the disaster, variety of actors involved in the recovery process, as well as the process of recovering itself, should all contribute to improvements in access to the seven capital levels. To this end, the outcome of resilient disaster recovery would include reductions in all forms of vulnerability and resilience, as well as improved sustainability of livelihood activities.

8.2 Recommendations

The research specifically set out to conceptualize resilient disaster recovery as the basis for an evaluative framework to assess long-term disaster recovery programming. Through the implementation of the RDR-AF model for evaluating disaster recovery initiatives, the results of the research suggest several recommendations for improving the effectiveness of recovery programming, particularly in the livelihoods sector. The following section provides an overview of the practical recommendations for future recovery programming. This begins with recommendations specifically related to earthquake events, before broadening to include strategies that would be useful for a variety of hazards and disasters in different locations.

Specifically in the case of earthquake events, the research suggested there were several areas where lessons learned could be implemented for future recovery efforts. The following section highlights issues with regards to the sheltering sector, including temporary and permanent housing reconstruction:

- The decision on whether to implement a one-step versus a two-step housing solution should be delineated by local, provincial and national governments as part of their disaster management planning in order to help promote quick decision-making in the post-disaster period.
- Locally applicable temporary and permanent housing solutions should be outlined in disaster management planning strategies prior to disaster events, particularly for areas with high-risk of earthquakes. This will help improve the effectiveness and efficiency of the sheltering program, and limit the necessity for time-consuming consensus-building and shelter strategy development in the post-disaster period.
- Strategies to promote quick rebuilding of permanent housing (i.e. the construction deadlines for each phase of funding) should be carefully considered in conjunction with local strategies for recovery (i.e. the use of *gotong royong*). This will help to ensure that communities can make full use of local capacities and strengths in order to promote full recovery.

With regards to livelihood programming, there are several recommendations for implementation based on the results of the research. These include:

- Humanitarian and government agencies should place a higher emphasis on funding for livelihood programming.

- Funding and strategies for livelihood programming should be commenced earlier in the recovery period, as opposed to waiting until permanent housing (in the case of earthquake reconstruction) has been completed.
- Livelihood programming should be based on a careful assessment of local capacities and strengths. Without a clear understanding of local access to various capitals, there is a higher degree of risk that recovery programming will not meet the full needs of local villagers and households and may limit the impact and sustainability of livelihood programming.
- Livelihood programming should take a four-pronged approach, whereby there is an emphasis on training and skill development, the provision of capital and credit facilities, development of networks and linkages to market facilities, as well as implementing a range of skills and business activity training/programs within each village. This will help promote livelihood programming that fully supports villagers and allows multiple households to take advantage of recovery initiatives, particularly when beginning new entrepreneurial activities.
- Implementing a range of skills and business activity training/programs within each village will help support economic development, limit competition between entrepreneurial businesses, and provide a range of options for households to explore their strengths. This will also help to avoid market saturation and allow households to achieve the full potential of production and markets.
- Livelihood programming should also focus on developing a range of secondary income strategies to support households through periods of seasonal unemployment, thereby promoting stable income levels.

In terms of the humanitarian response system, the research highlighted funding and accountability structures as an ongoing issue preventing long-term intervention strategies that seek to reduce vulnerability and build resilience to future disaster events. Therefore, the following recommendations are made:

- Funding structures for humanitarian response organizations should shift to emphasize long-term solutions, as opposed to short-term deliverables, in order to effectively use the ‘window of opportunity’ provided by disaster events and reduce vulnerability to future disasters.
- Increased accountability for response and recovery programming towards meeting the needs of local populations and contributing to ongoing vulnerability reduction and capacity building activities. This would suggest increased accountability towards beneficiaries, as

well as funders, who should be interested in seeing their donations contribute to long-term, sustainable solutions.

Linking government and humanitarian responses, the Yogyakarta earthquake case study provided some key insights on strategies to improve response and recovery strategies for future disaster events:

- Symbolic gestures must be rooted in the context of damages and available funding in order to reduce the likelihood of false statements and confusion among impacted populations.
- Government and humanitarian organizations should place greater emphasis on psychological recovery in order to improve psychological recovery and increase emotional capacity to rebuild, as well as respond to future disasters.
- Increased focus on addressing the root causes of vulnerability, as opposed to visible manifestations of vulnerability. To achieve this recommendation, a multi-scalar approach to recovery which focuses on local conditions as well as policy contexts at broader scales is required. This may help to ensure increased sustainability of recovery operations and improve the overall effectiveness of recovery programming.
- Further incorporation of concepts of resilience in recovery programming would help to address opportunities for change and increase ability to cope and respond to future hazards and disasters.
- Monitoring of recovery programming should incorporate a follow-up component whereby assessment occurs following the completion of assistance, in order to fully understand the long-term implications of the recovery program.

8.3 Future Research

Based on the results of the research and comments from villagers, government officials, academics and NGO practitioners, there are several areas that require further insight and research. These issues particularly focus on improving the implementation of recovery programming and increasing knowledge and efficiencies associated with reconstruction and rehabilitation. While the recommendations are derived from the 2006 Yogyakarta earthquake recovery context, further understanding in these identified areas would be useful for disaster recovery programs in other regions as well.

In the context of earthquake events, further understanding of the role of transitional housing is required in order to determine the effectiveness of a two-step housing solution. Two-step housing solutions may increase safety, security, improve living conditions during the reconstruction phase,

reduce the pressure for immediate reconstruction and provide the time and forum for discussions and training on construction standards and community planning (E-02). This approach understands housing as social construct, whereby constructing earthquake-resistant housing is regarded as a sociological process. On the other hand, evidence from this research suggests villagers were eager to return to permanent housing as quickly as possible and the time spent living in transitional housing may have been limited. Thus, further research is required on the processes of one-step versus two-step housing solutions and comparisons in conditions of vulnerability between those households that received transitional housing compared to those who did not.

When providing humanitarian assistance, aid organizations have long struggled to reach a balance between providing assistance and relief without creating a context in which households become dependent on aid. In the case of the 2006 Yogyakarta earthquake recovery program, there was discussion over the amount of assistance provided for housing reconstruction. While housing for some, particularly the poorest, was improved in quality and style, for others, the limited funding meant that households had to sell assets and use savings to complete the housing reconstruction process. Although the recovery program was established with the assumption that households would have to contribute to their own recovery, in cases where households have been unable to re-accumulate savings and assets, this has contributed to increased vulnerability to further stresses and shocks, and a reduction in ability to pay for other services, such as health and education. Thus, further research is required into how community-based reconstruction programming can provide sufficient aid and resources to reduce vulnerability to future disasters, while still maintaining an approach that recognizes impacted populations should contribute to their own recovery.

The research also highlighted the limited impacts of micro-financing institutions for providing assistance to households in terms of recovering their livelihood activities. Households were either using loans to provide for daily living needs or were unable to take on loans due to the risk involved. This suggests that micro-financing may not be an appropriate livelihood strategy to address the needs of the poorest in disaster-affected communities (E-02; E-07). In order to contribute to effective implementation of micro financing as a poverty-reduction tool, further research on successful implementations of micro-financing programs for low-capital, low-skill households is required.

Further research is also required into how recovery programming and interventions to strengthen government capacity can be implemented while maintaining local and social resiliencies.

Strengthening the government capacity to prepare and respond to hazards and disasters should be complementary to local strategies for resilience-building, yet this research has indicated this is not always the case. Reductions of vulnerabilities should occur in conjunction with resilience-building, although in some cases, there may be difficulties. For example, government initiatives to implement community-based reconstruction programs based on strict deadlines to ensure completion of reconstruction in a timely manner limited the use of *gotong royong* in many communities, thereby reducing the value of this important social resource for implementing the reconstruction program.

Another area for research involves the inclusion of traditional knowledge during disaster recovery. In the Yogyakarta context, traditional settlement locations, building materials and style of housing has undergone rapid transformations over the past half-century. Due to a loss of traditional knowledge regarding risk reduction techniques, households are locating in increasingly risky environments, and rejecting traditional bamboo and wooden housing structures in favour of more ‘modern’ cement housing. Further knowledge on how to maintain important aspects of local knowledge for disaster risk reduction within the context of changing social needs is required.

8.4 Conclusion

The research set forth to conceptualize the process of resilient disaster recovery. This contributed to further knowledge on conceptualizing and evaluating recovery programs, but also highlighted how improvements could be made to future disaster recovery efforts. Although these recommendations attempted to highlight general strategies for future disasters, it should also be noted that disaster recovery processes and experiences are highly dependent on local context. Pre-existing social, economic and political conditions, as well as the characteristics and impacts of the disaster will dictate how resilient disaster recovery can be implemented. Thus, this research should serve as a guideline for understanding recovery, although the contextual differences between different places should be acknowledged.

Returning to ideas expressed in the introductory chapter where disasters were characterized by “exposure to hazard, massive personal and societal loss, and profound and enduring life change” (Shultz, Espinel, Galea, & Reissman, 2006, p. 69), the following observations can be made. First, exposure to hazards represents an ongoing issue for human societies. Although structural and non-structural mitigation methods can be employed to reduce exposure or increase the capacity to

absorb the impacts, it should be recognized that societies must adapt to the environments in which they live. This was noted by one interviewee who noted that “humans should live in balance and harmony with the environment they live in so that they can easily adapt and adjust the way they live” (HI 04-021). Furthermore, although large-scale disaster events result in massive personal and societal loss, these events may present an opportunity to implement large-scale transformations that may not be possible during non-recovery periods. While disaster events may be characterized by profound life change, implementation of resilient disaster recovery promotes change in the form of adaptation and transformation. Resilient disaster recovery promotes the idea that individuals, households, and communities will be armed with a variety of tools to resist against future hazards and develop into a more resilient form. This adaptation should facilitate improved capacity to cope with and respond and recover from future disaster events.

APPENDIX 1 - Research Participant Information

Household Interview Participants				
Interview No.	First Interview	Follow-up Interview	Location	Language
01-001	May 24, 2011	n/a	Puton, Bantul	Indonesian
01-002	May 24, 2011	n/a	Puton, Bantul	Indonesian
01-003	May 24, 2011	n/a	Puton, Bantul	Indonesian
01-004	May 24, 2011	n/a	Puton, Bantul	Indonesian
01-005	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-006	May 24, 2011	n/a	Puton, Bantul	Indonesian
01-007	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-008	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-009	May 25, 2011	n/a	Puton, Bantul	Javanese
01-010	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-011	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-012	May 25, 2011	n/a	Puton, Bantul	Indonesian
01-013	May 27, 2011	n/a	Puton, Bantul	Indonesian
01-014	May 27, 2011	n/a	Puton, Bantul	Indonesian
01-015	May 27, 2011	n/a	Puton, Bantul	Indonesian
01-016	Jan. 27, 2011	May 27, 2011	Puton, Bantul	Indonesian
01-017	Feb. 3, 2011	May 27, 2011	Puton, Bantul	Indonesian
01-018	Feb. 2, 2011	May 27, 2011	Puton, Bantul	Indonesian
01-019	Jan. 25, 2011	May 25, 2011	Puton, Bantul	Indonesian
01-020	Jan. 25, 2011	May 25, 2011	Puton, Bantul	Indonesian
01-021	Jan. 25, 2011	May 25, 2011	Puton, Bantul	Indonesian
01-022	Jan. 27, 2011	May 27, 2011	Puton, Bantul	Indonesian
01-023	Jan. 26, 2011	May 27, 2011	Puton, Bantul	Indonesian
01-024	Jan. 24, 2011	June 8, 2011	Puton, Bantul	Indonesian
01-025	Jan. 26, 2011	May 27, 2011	Puton, Bantul	Indonesian
02-001	Feb. 7, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-002	Feb. 4, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-003	Feb. 4, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-004	Feb. 7, 2011	June 8, 2011	Kategan, Bantul	Indonesian
02-005	Feb. 9, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-006	Feb. 9, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-007	Feb. 9, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-008	Feb. 9, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-009	Feb. 14, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-010	Feb. 14, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-011	Feb. 14, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-012	Feb. 14, 2011	June 6, 2011	Kategan, Bantul	Indonesian
02-013	June 6, 2011	n/a	Kategan, Bantul	Indonesian
02-014	June 6, 2011	n/a	Kategan, Bantul	Javanese
02-016	June 8, 2011	n/a	Kategan, Bantul	Indonesian
02-017	June 8, 2011	n/a	Kategan, Bantul	Indonesian
02-018	June 9, 2011	n/a	Kategan, Bantul	Indonesian
02-019	June 8, 2011	n/a	Kategan, Bantul	Indonesian

Household Interview Participants – Cont'd				
Interview No.	First Interview	Follow-up Interview	Location	Language
02-020	June 8, 2011	n/a	Kategan, Bantul	Indonesian
02-021	June 6, 2011	n/a	Kategan, Bantul	Javanese
02-022	June 8, 2011	n/a	Kategan, Bantul	Indonesian
02-023	June 9, 2011	n/a	Kategan, Bantul	Indonesian
02-024	June 9, 2011	n/a	Kategan, Bantul	Indonesian
02-025	June 9, 2011	n/a	Kategan, Bantul	Javanese
03-001	March 3, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-002	March 2, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-003	March 2, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-004	March 6, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-005	March 6, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-006	March 6, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-007	March 6, 2011	June 13, 2011	Ngandong, Klaten	Indonesian
03-008	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-009	June 16, 2011	n/a	Ngandong, Klaten	Javanese
03-010	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-011	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-012	June 18, 2011	n/a	Ngandong, Klaten	Javanese
03-013	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-014	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-015	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-016	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-017	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
03-018	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-019	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-020	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-021	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-022	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-023	June 18, 2011	n/a	Ngandong, Klaten	Indonesian
03-024	June 18, 2011	n/a	Ngandong, Klaten	Javanese
03-025	June 16, 2011	n/a	Ngandong, Klaten	Indonesian
04-001	April 4, 2011	May 30, 2011	Wonokromo, Bantul	Indonesian
04-003	June 1, 2011	n/a	Wonokromo, Bantul	Indonesian
04-004	March, 2011	May 30, 2011	Wonokromo, Bantul	Indonesian
04-005	April 4, 2011	June 3, 2011	Wonokromo, Bantul	Indonesian
04-006	March 17, 2011	June 1, 2011	Wonokromo, Bantul	Indonesian
04-007	April 5, 2011	May 30, 2011	Wonokromo, Bantul	Indonesian
04-008	April 5, 2011	June 1, 2011	Wonokromo, Bantul	Indonesian
04-009	April 5, 2011	June 1, 2011	Wonokromo, Bantul	Indonesian
04-010	June 1, 2011	n/a	Wonokromo, Bantul	Indonesian
04-011	April 7, 2011	June 1, 2011	Wonokromo, Bantul	Indonesian
04-012	June 1, 2011	n/a	Wonokromo, Bantul	Indonesian
04-013	April 4, 2011	June 3, 2011	Wonokromo, Bantul	Indonesian
04-014	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-015	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian

Household Interview Participants – Cont'd				
Interview No.	First Interview	Follow-up Interview	Location	Language
04-016	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-017	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-018	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-019	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-020	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-021	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-022	May 30, 2011	n/a	Wonokromo, Bantul	Indonesian
04-023	June 1, 2011	n/a	Wonokromo, Bantul	Indonesian
04-024	June 1, 2011	n/a	Wonokromo, Bantul	Indonesian
04-025	June 3, 2011	n/a	Wonokromo, Bantul	Indonesian
05-001	April 11, 2011	June 14, 2011	Cabakan, Sengon, Klaten	Indonesian
05-002	April 11, 2011	June 14, 2011	Cabakan, Sengon, Klaten	Indonesian
05-003	April 11, 2011	June 14, 2011	Cabakan, Sengon, Klaten	Indonesian
05-004	April 12, 2011	June 14, 2011	Cabakan, Sengon, Klaten	Indonesian
05-005	April 12, 2011	June 15, 2011	Cabakan, Sengon, Klaten	Indonesian
05-006	April 12, 2011	June 15, 2011	Cabakan, Sengon, Klaten	Indonesian
05-007	April 13, 2011	June, 2011	Cabakan, Sengon, Klaten	Indonesian
05-008	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-010	April 13, 2011	June, 2011	Cabakan, Sengon, Klaten	Indonesian
05-011	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-012	April 14, 2011	June, 2011	Sumberejo, Sengon, Klaten	Indonesian
05-013	April 14, 2011	June, 2011	Sumberejo, Sengon, Klaten	Indonesian
05-014	April 14, 2011	June, 2011	Sumberejo, Sengon, Klaten	Indonesian
05-015	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-016	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-017	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-018	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-019	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-020	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-021	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-022	June 15, 2011	n/a	Cabakan, Sengon, Klaten	Indonesian
05-023	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-024	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-025	June 20, 2011	n/a	Sumberejo, Sengon, Klaten	Indonesian
05-026	April 13, 2011	June, 2011	Cabakan, Sengon, Klaten	Indonesian
05-027	April 13, 2011	June, 2011	Cabakan, Sengon, Klaten	Indonesian
05-028	April 14, 2011	June, 2011	Sumberejo, Sengon, Klaten	Indonesian

Focus Group Discussions				
Focus Group No.	Date	Number of Participants	Location	Language
FG-01	February 6, 2011	7	Puton	Indonesian
FG-02	February 27, 2011	11	Kategan	Indonesian
FG-03	March 18, 2011	9	Ngandong	Indonesian
FG-04	April 11, 2011	9	Wonokromo	Indonesian
FG-05	April 8, 2011	9	Sengon	Indonesian

Community Meetings			
Meeting No.	Date	Location	Language
CM-01	Dec. 2010 – Apr. 2011	Puton	Indonesian
CM-02	Dec. 2010 – Apr. 2011	Kategan	Indonesian
CM-03	Feb. – Apr. 2011	Ngandong	Indonesian
CM-04	Dec. 2010 – Apr. 2011	Wonokromo	Indonesian
CM-05	Mar. – Apr. 2011	Sengon	Indonesian

Expert Interviews				
	Interview No.	Date	Location	Language
NGOs	E-01	April 29, 2011	Yogyakarta City	English
	E-02	May 11, 2011	Bantul, Yogyakarta	English
	E-03	May 23, 2011	Yogyakarta City	English
	E-04	June 1, 2011	Yogyakarta City	English
	E-05	May 16, 2011	Skype interview	English
	E-06	April 20, 2011	Yogyakarta City	English
	E-07	June 2, 2011	Yogyakarta City	English
Academic	E-08	April 30, 2011	Yogyakarta City	English
	E-09	May 3, 2011	Yogyakarta City	English
	E-10	May 16, 2011	Yogyakarta City	English
	E-11	May 11, 2011	Yogyakarta City	English
	E-12	May 13, 2011	Sleman, Yogyakarta	English
Gov't	E-13	May 6, 2011	Bantul, Yogyakarta	Indonesian
	E-14	May 12, 2011	Yogyakarta City	English
	E-15	May 16, 2011	Sleman, Yogyakarta	English
	E-16	June 9, 2011	Bantul, Yogyakarta	English
	E-17	May 23, 2011	Yogyakarta City	English

APPENDIX 2 – Household Interview Question Guide

Date _____ Location _____ Survey No _____

Oral Consent Obtained (Time): _____

Introduction Questions

Can you tell us a little bit about yourself (age, highest level of education, occupation?)

Can you tell us a little bit about your household (i.e. other household members, who is head of household, education levels of other members)

How long have you lived in your village?

Specific to 2006 Earthquake recovery

Can you describe your experience during and after the 2006 earthquake?

- What was your experience during and right after the earthquake? What did you do?
- Where did you live in the weeks/months following the disaster?
- Where did your food and income come from?
- How long after the earthquake did you start earning an income again?
 - o If a long time – why did it take you so long to start earning an income again?
- What type of job did this income come from?
- Was this the same income source you earned income from before the earthquake?
- How long did you live in temporary housing (and what type)?
- How long did it take you to rebuild your permanent house?
- Did you wait for government funding before rebuilding your permanent house or did you start rebuilding with your own money/savings?
- Did you use gotong royong to rebuild your permanent house?
- Would you say your permanent house is finished?
- At what point would you say that the recovery effort was finished?

What type of assistance did you receive to help recover?

- Where did you receive the assistance from?
- How long did the assistance last (i.e. how long did the food aid last? At what point did you have to start paying for food again?)

How well did this assistance meet your needs?

- Were you satisfied with the immediate response and aid provided?
- Were there any items that you needed or wanted that you didn't get?
- Within your community, do you feel the aid was distributed fairly? Why or why not?
- Thinking of all the areas affected by the earthquake disaster, do you think the aid was distributed fairly? Why or why not?

Thinking of the 2006 recovery effort, would you describe it as successful? Why or why not? What do you think could have been done to make the recovery effort more successful?

- Would you say that you have now recovered from the disaster?

- What aspects of the recovery do you think could have been done better?
- What was done well?
- Was there a program or funding you wanted from the government or NGOs that you didn't get?
- Are there any problems in your community that didn't exist before the earthquake?
- What do you think is better about your community since the earthquake?
- Do you think your home is earthquake resistant?
- Have you made any additions to your permanent house? If yes, did you use the same construction guidelines?
- Do you plan to make any additions to your house? If so, would you use the same construction guidelines?
- What did you learn from the earthquake disaster about yourself?
- What did you learn from the earthquake disaster about reducing vulnerability?

What inspired you or gave you strength to recover after the earthquake?

General Questions:

Can you describe your livelihood activities?

- In what ways do you earn income?
- Is this your only source of income for your household? If no – what other sources of income do you have?
- Are there any challenges to completing your livelihood activities?
- Would you like to increase your income?
- How could you increase your income?
- What is preventing you from increasing your income?
- Have there been any changes in your income or livelihood activities comparing before and after the earthquake?

Where are you getting your food from?

- What type of food are you growing/raising to eat? Growing anything to sell?
- What type of food do you purchase?
- What is the percentage of food you grow yourself versus purchasing?
- Have there been any changes in food sources comparing before and after the earthquake?

Thinking about education – what level of education would you like your children to receive (or have received)?

- If children have finished school but not higher education – why did your children only complete that level of education? Did you want them to go on? What prevented them from going on to higher education?
- If children are still young – what level would you like your children to complete at school? Will you be able to help your children obtain that level of education? What would prevent your children from attending school to that level?

Thinking about health aspects – are you satisfied with healthcare availability?

- Do you have JAMKESMAS?
- If you don't have it – do you think you should have it? If so, why don't you have it?
- If you don't have it – can you afford healthcare services?

- If you couldn't afford the healthcare, what would you do?

How satisfied are you with the government?

- In the dusun, are you satisfied with the local government?
- If you had a problem, what would you do?
- Do you feel your problem could be resolved at the community (dusun) government level?
- What about the desa government or the regency government? Do you feel satisfied with the way they run things?
- Are you satisfied with the central government?

Thinking about the local economy, do you feel that it is strong?

- Are there many jobs available?
- Is the income from the jobs good?
- What are some of the problems with the local economy?
- Is the price of food and other goods affordable for you?
- Is there any difference in the local economy comparing before and after the earthquake?

Hazards General Questions:

What do you think causes earthquakes?

What do you think causes disaster events?

Do you think humans have any role in disasters?

What are the main types of hazards that could occur in this community?

What do you do to try to minimize the impacts of those disasters? What do you think still needs to be done to reduce vulnerability to future disaster events?

Do you feel prepared to deal with another disaster event? Why or why not?

Do you belong to any social/community organizations? Can you talk a little bit about those organizations?

Do you have access to affordable, clean water? Garbage and sanitation? Electricity? Is your access to these items the same or different compared to before the earthquake?

Do you have access to a motorbike? Is this necessary for your occupation?

Do you have access to a handphone? Is this necessary for your occupation?

Do you have access to credit and loans? Micro-credit?

Do you have savings? Did you have savings before the earthquake? Did you use any of your savings to recover from the earthquake disaster? If so, what are you saving for? How long could your savings sustain your household in the event of a disaster event?

Do you believe that climate change has impacted you or your community at all? In what ways does unpredictable weather impact you and this community?

Do you have access to any social programming to improve the quality of your life? Any livelihoods training/skills programs? Micro-credit? Animal breeding programs?

APPENDIX 3 – Focus Group Question Guide

2006 Yogyakarta Earthquake Questions

For these questions, please try to think about you and your community's experiences with the 2006 earthquake event.

1. What aspects of the recovery effort from the 2006 earthquake do you think were well done?
2. What aspects of the recovery effort from the 2006 earthquake could have been improved?
3. Do you think certain villagers had more difficulty recovering than others? If yes, what led to these differences? What could be done to reduce some of those difficulties?
4. What was done (or could have been done) to help the community recovery faster?
5. In what ways did the community adapt or transform after the earthquake event that could help build capacity to respond to future disaster events?
6. What was done (or could potentially be done) to help villagers absorb the impacts (to minimize impacts) of future earthquake events?
7. How would you describe successful disaster recovery?
8. Do you think there are other interpretations of successful disaster recovery? If so, what are they?
9. Did you witness any conflict during the recovery effort regarding the direction the recovery effort should take? If so, how were these conflicts resolved? Do you think all community members felt satisfied?

General Questions

10. What do you think are the biggest concerns (not just hazards related – all areas) facing your sub-village? What do you think can be done to try to remedy these concerns?
11. In what ways could the local economy be improved in this dusun?
12. What could be done to raise the living standards of poorer members of this dusun?
13. The issue of unreliable or insecure income has been raised as an important issue...what do you think could be done to improve the security of income?
14. What do you think are some of the underlying causes of poverty and low standards of living in this area?
15. If you had access to unlimited funds, what types of programs or initiatives would you like to see developed in this community?

APPENDIX 4 – Expert Interview Question Guide

1. Please explain your organization's role during the recovery effort from the 2006 Yogyakarta earthquake:
2. What aspects of the recovery effort (in general or specific to your organization) do you think were well done?
3. What aspects of the recovery effort (in general or specific to your organization) could have been improved?
4. Overall, how would you assess the recovery effort? Do you think it was successful? Why or why not?
5. How would you describe successful disaster recovery?
6. Can you explain what makes a person, household or community vulnerable to disaster events?
7. Can you explain what makes a person, household or community resilient to disaster events?
8. What do you think is the relationship between vulnerability and resilience?
9. What is the role of sustainable livelihoods during disaster recovery?
10. How do sustainable livelihoods contribute to resilient households and communities?
11. Do you think that concepts of vulnerability, resilience and sustainable livelihoods are useful for guiding disaster recovery efforts?

APPENDIX 5 - Sustainable Livelihoods Capital Rankings

CAPITAL:		VILLAGE SCORES				
		PUTON	KATEGAN	WONOKROMO	NGANDONG	SENGON
Human	Education levels	0	0	1	0.5	0.5
	Skill levels	0.5	0	1	1	0.5
	Health levels	0.5	0.5	1	0.5	0.5
	Hazard knowledge	0.5	0	0.5	0.5	0.5
	Disaster preparedness levels	1	0	0.5	0.5	0
TOTAL HUMAN SCORE:		2.5	0.5	4	3	2
Social	Family Networks - external	0.5	0.5	1	0.5	0.5
	Family Networks - internal	1	1	1	1	1
	Social harmony	1	1	0	1	0.5
	External networks - formal	1	0	1	0.5	0
	External networks - informal	0.5	0	1	1	0
TOTAL SOCIAL SCORE:		4	2.5	4	4	2
Physical	Strength of housing	1	1	1	1	1
	Awareness of building standards	1	1	1	1	1
	Electricity, water & sanitation	0.5	0.5	1	1	0.5
	Replacement of production tools	0.5	0	0.5	0	0
	Irrigation systems	1	1	0	0	0.5
TOTAL PHYSICAL SCORE:		4	3.5	3.5	3	3
Financial	Levels of savings/assets	0.5	0	1	0.5	0.5
	Access to credit	1	0.5	1	0.5	0.5
	Employment levels	0.5	0	1	1	0
	Level of income	0.5	0	1	0.5	0
	Stability of income	0.5	0	1	0.5	0
TOTAL FINANCIAL SCORE:		3	0.5	5	3	1
Natural	Access to natural resources	0	0	0	0	0
	Access to agricultural land	1	1	0	1	1
	Quality of agricultural land	1	1	0	0	0
	Climate variability impacts	0.5	0.5	1	0	0
	Risk of hazards	0	0.5	0	0	0
TOTAL NATURAL SCORE:		2.5	3	1	1	1
Political	Strength of local leadership	1	0.5	1	1	0.5
	Levels of corruption	1	1	0	1	0
	Accountability	0	0	1	0.5	0
	Aid distribution	1	1	0.5	1	0
	Innovative programming	1	0	1	0.5	0
TOTAL POLITICAL SCORE:		4	2.5	3.5	4	0.5
Cultural	Religious faith	0.5	0.5	1	0.5	0.5
	Use of <i>gotong royong</i> - emergency	1	1	0.5	1	1
	Use of <i>gotong royong</i> - permanent	0.5	0.5	0	1	0.5
	Javanese philosophy <i>nrimo</i>	1	1	1	1	1
	Familial + kinship networks	1	1	1	1	1
TOTAL CULTURAL SCORE:		4	4	3.5	4.5	4

APPENDIX 6 - Strengths and Weaknesses of Various Sustainable Livelihoods Approaches

Agency	Date	Origins	Core Ideas and Principles	Asset Categories	Distinguishing Features	Advantages	Challenges
DFID	1998	1997 White Paper on International Development - DFID committed to supporting policies and actions that promote SL in the context of poverty elimination	Six guiding principles, including people centred, responsive and participatory, multi-level, partnership, various types of sustainability, dynamic. Additional principles being considered holistic and strength-based as well as integration of rights based approaches and gender issues	Human, social, natural, physical and financial	Sustained effort and commitment of resources to promote SLA and cross-sectoral work - broad integration and understanding of SL approaches - strong support for SLA among senior management	SLA key in identifying and addressing the needs of the poor and in promoting departmental synergies/cross-sectoral links	Continuing development of SLA at a meso and macro level, integration of new forms of analysis. Increasing emphasis on PIP's. Strengthening micro-macro linkages across DFID divisions, integration of livelihoods into health and education sectors, addressing gender, power relations and politics
EC	2001	EC Policy and Approach to Rural Development: Fighting Rural Poverty, DG Dev.	Incorporates some livelihood analysis by drawing on SLF and acknowledges the importance of sustainability in development work	Human, social, natural, physical and financial	Range of activities supported	Better targeting of these comparative advantages and appropriate interventions	Understanding and accepting of the SL Core concepts and mainstreaming of SL principles across a multi-donor organization
FAO	1998	IWG-PA initiated Livelihood Support Programme launched in response to inter-agency Siena Livelihoods Forum	SL principles align with FAO strategic framework. Core FAO principles are: multidisciplinary approach to food security, empowerment of rural people through participation in community planning, sustainable management of resources, equitable access to land and investment, partnership	Human, social, natural, physical and financial	n/a	Contributes towards FAO meeting corporate strategies by enhancing the quality, relevance and impact of FAO's normative work and assistance initiatives	FOA is a decentralized technical agency, largely organized by sector, the challenge is to build cross-sectoral teams and raise awareness across a wide range of countries, languages and cultures
IFAD	2001	Post Siena, a Memorandum of Understanding with DFID - establishing the Sustainable Livelihoods Diagnostic and Learning Trust Fund (SLDLTF)	Framework draws on SL principles of partnership, participation, building on people's existing skills and livelihoods strategies - also emphasizes access to access and the need to 'enable enablers'	Own definition of assets informed by DFID's approach	Strategies for strengthening the capacity of the poor is based on partnership	The value of stakeholder consultation during design to promote increased understanding and ownership	Implementing the shift from rigid programmes when working with national governments - development of new skills within partnerships

UNDP	1995	Adopted SL as part of Sustainable Human Development agenda. SL unit in its Social Development and Poverty Elimination Division - but disbanded in 2001	People-centred, participatory approaches, holistic vision of development, empowerment, use of appropriate technology, financial services and good governance	Human, social, natural, physical and economic (sometimes also political)	Emphasis on technology as a key means to help poor people. Poverty-environment network (PENet) disseminating lessons/good practice in the use of participatory methods	Integrates poverty, environmental, social, financial and governance issues into a holistic framework for analysis and programming	Establishing SLA at the country and decentralized level through inclusive and comprehensible programmes so as to build widespread support with UNDP
WB	1990s	Participation Learning Group and World Development Report (2000/01) with influences from other donors	Draws on the early work of Chambers and Chambers & Conway - emphasis on vulnerability and assets	Natural, social, physical, financial and human	Seeking ways to adapt the terminology and content of SLA to fit in with its other strategic objectives (e.g. human rights and livelihoods security)	Contributed towards deepening the understanding of multi-dimensional nature of poverty, emphasizing the importance of assets rather than income - helped draw links between operational and policy level activities	Greater critical mass of staff needs, familiarization of SLA if the approach is to be adopted more broadly. Finding appropriate and practical ways to use multi-sectoral SLA with governments and ministries
WFP	1999	Key themes in policy directive 'Enabling Development' (ED) align with SL principles. Post Siena, an Institutional Strategy Paper outlined a WFP/DFID partnership to increase use of SLA in WFP programming cycle	ED addresses exclusion of poor and marginalized groups by using food aid as an 'enabler'. ED is people-centred and participatory in approach, examines vulnerability and focuses on enabling the poor to access, preserve and invest in assets	Social, human, natural, physical and financial	Only one intervention tool - food aid. ED uses temporary food aid to enable chronic poor to escape the hunger trap	Aims to incorporate SLA at the country level in order to improve targeting of food insecure households, identify broader range of partners and address linkages between FAO food assistance activities and national policies	Budgetary and human resources required to familiarize a large organization with the SL principles and language, through capacity building and training
CARE	1994	CARE Long Range Strategic Plan	Four principles of HLS: people, holistic, disasters and development and micro and macro linkages	Social, physical, human, political, financial and natural	Emphasis on the household and vulnerability to natural disasters. Principles of accountability and social justice	Opportunity to combine disaster reduction and development interventions in one assistance strategy	HQ-driven conceptual approach onto autonomous country offices

Khanya	1998	Adapted version of DFID's SLA, emerged from best practice in social development, integration of environment, governance and change management	Distills SL principles into six governance issues: at the micro level - the involvement of poor people, existence of local service providers; meso - effective management by local government, provision of support and supervision; macro - strategic direction, international - national linkages	Natural, human, financial, physical and social - also included as strengths/weaknesses of SWOT analysis	The use of six governance issues and how they relate to SL principles. Greater prominence is given to opportunities, the disaggregation of PIP's. The use of an amended SLF as a tool in community-based planning	SLF has been used as a checklist of principles. Development planning using SLA linked participation with actors at provincial level and national policy, so creating micro-macro links	Ensure all partners have a common understanding of SL language and core concepts. Not thinking that holistic analysis needs holistic actions - linking bottom-up elements with strategic work
Oxfam	1993/94	Early adopter of SL principles - since 1994 has integrated SL into a rights-based framework - Global Charter for Basic Rights	Strategic plan outlines 'sustainable livelihoods' as a social and economic right. Stresses four dimensions - economic (markets, credit), social (networks, gender equity), institutional (capacity building, access to services and technology, political freedom), and ecological (quality and availability of environmental resources)	Human, social, natural, physical and financial	Increasing emphasis on roles of markets and trade in the livelihoods of poor people	SLF/A has potential to enhance policy advocacy work	The integration of SL and market analysis approaches
SC	1999	Household Economy Approach (HEA)	HEA describes the economy of a defined population and analyses the assets, capacities and opportunities available to poor people	Refers to assets, savings and reserves, including food stocks, cash savings, livestock holdings and other tradable assets	HEA complements SLA and can be used to operationalize the SL framework	Through SLA the promotion of more strategic and transparent approaches to social protection, poverty mitigation and targeting of assistance	Many of the causes of livelihood insecurity identified are the result of global actions and cannot be resolved through discrete project interventions
SID	1995	Sustainable Livelihoods Action Research Programme arose from SID's efforts to support networks that promote sustainable livelihoods and social justice	Core principles - local people are the main actors in social transformation, complementary actions are key, collective/individual empowerment requires social energy and political space, micro-macro linkages must be examined	Not specified	Recognition that maintaining a lasting commitment to SLA requires institutional mechanisms that ensure the accountability of agencies to local people and responsiveness to their demands	SL Programme use to promote, strengthen and multiply grassroots initiatives and local innovations by establishing networks	Developing effective ways to draw lessons from positive local processes using SLA and scaling these up to the meso and macro levels

Source: (Hussein, 2002, pp. 51-54)

APPENDIX 7: Review of Selected Vulnerability, Resilience and Sustainable Livelihoods Methods

Assessment Method	Organization	Date	Strengths	Weaknesses
Capacities and Vulnerability Assessment (CVA)	Harvard Graduate School of Education through the International Relief/Development Project (IRDP),	late 1980's	<ul style="list-style-type: none"> - incorporation of both vulnerability and capacity - holistic approach recognizes the uniqueness of each place 	<ul style="list-style-type: none"> - localized nature of this approach limits the ability to examine larger-scale processes impacting vulnerability and capacity - lack of consistent set of indicators - physical characteristics converged into category with other human characteristics
Vulnerability and Capacity Assessment (VCA) **	International Federation of Red Cross/Red Crescent Societies	early 1990's	<ul style="list-style-type: none"> - importance of analyzing hazards is recognized and provided own step in the framework - designed to be conducted before hazardous event acknowledges that vulnerability existed before hazard - focus on both micro and macro scale processes that impact vulnerability 	<ul style="list-style-type: none"> - broadness of coverage and lack of indicators places effectiveness of VCA on practitioners at local level - limited review of methods for analyzing data and data triangulation
Household Livelihood Security Assessment (HLSA) **	CARE	1994	<ul style="list-style-type: none"> - implementation of a 'right's based' approach focuses beyond the scale of the community into the realm of policy-issues and activism - provides communities with a method for addressing local concerns - focuses on power relations - analyzes vulnerability at a variety of scales while still recognizing importance of place 	<ul style="list-style-type: none"> - understanding of vulnerability is limited and focuses almost exclusively on poverty, ignoring issues such as preparedness and experience - focus on poverty and livelihood strategies limits risk factors to those affecting income-generating activities - does not explicitly recognize the importance of hazards and biophysical processes
Risk Mapping and Local Capacities (RMLC)	Oxfam	1997 Central America	<ul style="list-style-type: none"> - recognizes the importance of including conflict hazards and struggles associated with access to resources - explores vulnerability both in terms of social processes and biophysical processes - examines power hierarchies, including gender inequalities 	<ul style="list-style-type: none"> - capacities analysis is limited, focusing almost exclusively on disaster management and government institutions - limited acknowledgement of the role of individuals and households in capacity building - scale of analysis is regional, perhaps ignoring inequalities that exist at smaller scales

Food Economy Approach (FEA)	Save the Children Fund	early 1990's	<ul style="list-style-type: none"> - by linking vulnerability analysis to everyday conditions of the household, this approach explicitly links vulnerability to pre-existing conditions - as the hazard assessment step seeks to address issues and risk for the future, this approach has more appeal than the assessment methods that focus solely on historical hazards - use of food economy zones, as opposed to bureaucratic boundaries 	<ul style="list-style-type: none"> - explicit focus on food security limits the impact of this model to other forms of hazards besides drought and famine - as the approach sets out of framework for collecting and analyzing information, with limited information on conducting and FEA, the skill of the practitioners is very important in obtaining accurate and informative results
Participatory Capacities and Vulnerability Assessment (PCVA) **	Oxfam	1998 South East Asia	<ul style="list-style-type: none"> - integrates the CVA approach with Participatory Rural Appraisal (PRA) methods - evolved categories of analysis explicitly acknowledge the link between disasters and development - other categories focus on perceptions, experience, and knowledge 	<ul style="list-style-type: none"> - used in conjunction with other tools, implying some information is missing - limited recognition of the importance of hazards and biophysical aspects of vulnerability - limited definitions and guidelines, particularly in the capacities category
Participatory Risk Mapping (PRM)	Smith, Barrett & Box	1999	<ul style="list-style-type: none"> - inexpensive and convenient method for identifying and prioritizing risks within areas with diverse populations, ethnicities and ecologies - using participatory research methods, explicitly acknowledges the role of local knowledge and coping strategies - information was coded and geographically referenced using a GPS in order to map the representations of risk provided 	<ul style="list-style-type: none"> - focuses on populations in arid and semi-arid biophysical conditions, although approach could be used in other areas - PRM focuses on perceived risks, with limited analysis of vulnerability (although the authors note that the populations studied were already some of the most vulnerable groups) - although coping strategies and solutions were discussed, this did not appear to be represented in the risk map
Participatory Vulnerability Analysis (PVA)	ActionAid	2000	<ul style="list-style-type: none"> - guidelines outline specific information required at each level of analysis - scale of analysis moves from local through to international levels, providing opportunities to examine both micro and macro-scale processes - involves representatives from community at all levels of analysis - empowering approach that facilitates dialogue - focus on development of action plans 	<ul style="list-style-type: none"> - focus on capacities seems secondary to focus on vulnerabilities - push for action plans does not seem to explicitly acknowledge the role of local and existing coping strategies - limited focus on the hazards and biophysical processes

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