Curtin University Sustainability Policy Institute

Mainstreaming Climate Change Adaptation in a Developing Country Context: an Indonesian Case Study

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This thesis is presented for the Degree of Doctor of Philosophy of Curtin University

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

li~ Signature :

Date : 3 April 2017

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ABBREVIATIONS

ACCCRN	Asian Cities Climate Change Resilience Network
ADB	Asian Development Bank
AUSAID	Australian Agency for International Development
Bappeda	Regional Agency for Planning and Development
Bappenas	National Development Planning Agency
BMKG	Meteorology, Climatology and Geophysics
BNPB	National Body for Disaster Management
BPBD	Local Body for Disaster Management
BPPT	Agency for the Assessment and Application of Technology
CBA	Community Based Adaptation
CME	Coordinator Ministry of Economic
CMHDC	Coordinator Ministry of Human Development and Indonesian Culture
CoP	Conference of the Parties
DFID	Department for International Development/United Kingdom
DNPI	National Council for Climate Change
EM-DAT	The International Disaster Database
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	Deutsche Gessellschaft fur Internationale Zusammenarbeit
HDI	Human Development Index
ICCTF	Indonesian Climate Change Trust Fund
ICLEI	International Council for Local Environmental Initiatives
IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
ISET	Institute of Social and Economic Transition
JICA	Japan International Cooperation Agency
LAPA	Local Adaptation Plan of Action
MASL	Mean above Sea Level
MDG	Millennium Development Goals
MEMR	Ministry of Energy and Mineral Resources

MLG	Multi-Level Governance
MMAF	Ministry of Marine Affairs and Fisheries
MoAG	Ministry of Agriculture
MoE	Ministry of the Environment
MoF	Ministry of Finance
MoHA	Ministry of Home affairs
МоН	Ministry of Health
MPR	People's Consultative Congress
MoPW	Ministry of Public Work
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Programme of Action
NAP	National Adaptation Plan
NGO	Non-Governmental Organisation
OECD	Overseas Economic Cooperation and Development
ODA	Overseas Development Assistance
PKKIM	Centre for Climate Change Financing and Multilateral Cooperation
REDD	Reducing Emissions from Deforestation and Forest Degradation
REPELITA	Five Yearly Development Plan
RPJM	National Middle Term Development Plan
RPJMD	Local Middle-term Development Plan
RKP	Government's Annual Work Plan
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
URDI	Urban and Regional Development Institute
VOC	United East India Company

Abstract

In response to the recognised challenges posed by climate change, mainstreaming adaptation into existing development policies and practices has been identified as a critical pathway for enhancing the resilience of communities. However, empirical evidence for how mainstreaming can be achieved, particularly in the context of developing countries, is limited.

To address this gap, this thesis focused on the case of Indonesia to examine how governments mainstream adaptation into the development planning agenda. A multi-sited approach was adopted to explore how adaptation policies were formulated and practiced at national, municipal and community levels. The study used qualitative methods including interviews, participant observation and document analysis.

A detailed account of climate adaptation policy and politics in Indonesia was developed, and, from this, it was found that national scale strategies had been developed with limited stakeholder engagement. This lack of stakeholder engagement in strategy development resulted in adaptation policies being poorly understood and difficult to enforce at the local scale. National level efforts to support the uptake of effective adaptation actions at the local scale also suffered from the absence of a lead agency, the lack of accurate and detailed data on recent and future climate scenarios, there being no legal basis to enforce policies, and limited financial resources.

This study also focused on identifying factors underpinning the mainstreaming adaptation into development policy at the local level. The most serious constraints were a lack of understanding about adaptation, less synergy and interaction among key stakeholders, limited human resources and no sense of obligation to develop an adaptation plan. The analysis further revealed that the willingness of local governments to initiate adaptation was driven by three key factors: (1) past extreme weather experiences; (2) strong commitment from elected leaders and the existence of policy entrepreneurs, and; (3) external support such as from an NGO.

The thesis revealed the importance of social capital in responding to climate hazards and the preparedness of local municipalities to mainstream adaptation to climate change within development policy. The findings illuminated the critical role that social capital had in creating a more resilient community, particularly in the context of limited government assistance.

The study found that to facilitate effective mainstreaming of adaptation into development policy it is crucial to involve and engage all adaptation stakeholders at different levels (vertical linkages) from international, national and local levels as well as inter-sector collaborations (horizontal networks). These findings contribute to enhancing the evidence base informing the formulation of climate change adaptation strategies, particularly in the context of a developing country.

Chapter One: Introduction

1.1 Background

Up until the early 1990s, the concept of mitigation was dominant in informing climate policy and strategies (Aakre & Rübbelke, 2010; Agrawala, 2004). Since this time there has been a steady shift towards incorporating the concept of adaptation into development planning. The shift from mitigation to adaptation was, in part, due to the slow progress in mitigation efforts to address the impacts of climate change and an increasing awareness that mitigation programs could have only a limited effect in reducing greenhouse gasses and the impacts of climate change (Bulkeley & Tuts, 2013; Keskitalo, Juhola, & Westerhoff, 2012). Furthermore, the scepticism that mitigation action alone could address the impacts of climate change (IPCC, 2007), along with the strong push from international development institutions for aid recipients to be 'climate proof' (e.g. Bisaro, Wolf, & Hinkel, 2010), contributed to the increasing prominence of the concept of adaptation on regional and global agendas (Bauer, Feichtinger, & Steurer, 2012; Biesbroek et al., 2010; Mickwitz, Aix, Beck, Carss, & Ferrand, 2009). Indeed, the Intergovernmental Panel on Climate Change (IPCC) proposed adaptation measures to assist populations in dealing with the impacts of climate change (IPCC, 2007).

A similar shift has occurred more recently in Indonesia where, after several years focusing on mitigation issues, the country turned its attention to adaptation. Of particular significance in informing this shift was the outcome of the Bali 13th United Nations Climate Change Conference (UNFCCC) meeting in 2007 that recognised that adaptation needed to be explicitly included in the post-2012 international climate change agreement (Ford & Ford, 2011).

Adaptation refers to "the process of developing, formulating, and implementing a strategy and policy to alter the effects of climate change and adapt to it" (Mimura, 2010, p. 4). In essence, adaptation is how to increase resiliency so as to reduce vulnerability (UNDP, 2007). However, efforts to adapt to climate change are complex and require a change in development planning (Gupta, 2010).

Indonesia, and moreover its response to the challenges presented by climate change, is of critical interest as the country is amongst the most vulnerable to the impacts of climate change (UNDP, 2007). Indonesia is vulnerable to climate changing due to its location, socio-

economic status as well as its climate politics. Located at the equator between the Pacific and Indian Oceans with more than 16,000 islands and approximately 81,000 km of coastline, Indonesia is among the countries projected to experience severe impacts from climate change - particularly sea level rise (BAPPENAS, 2010). Recent studies show that sea level in Indonesia has increased, on average, by 4 mm annually from 1993 to 2011 (Fenoglio-Marc et al., 2012). Considering that rice farming, which covers about 25% of the land territory and accounts for about 15% of GDP (Anggarendra, Guritno, & Singh, 2016), is often near coastal areas (BAPPENAS, 2010), it is expected there will be "a loss of arable land through inundation and increased soil salinity, affecting crop growth and yield" (Förster et al., 2011, p. 894). One estimate suggests that the national production of rice will have decreased between 20.3% and 27.1% in 2050 from 2008 levels (BAPPENAS, 2010). Another study estimates that by 2050 the area of paddy rice fields could be reduced by 182,556 ha in Java and Bali, 78,701 ha in Sulawesi, 25,372 ha in Kalimantan, 3,170 ha in Sumatra, and 2,123 ha in Lombok (Suroso, Hadi, & Salim, 2009).

In this regard, the impacts of climate change in Indonesia will include decreasing food production, water shortage, environment degradation, and human health problems (BAPPENAS, 2010). Salamanca, Dwisasanti, Rigg, and Turner-Walker (2013) estimates that approximately 40% of the population live in natural hazard-prone areas. Economic loss due to climate changes is estimated to be equivalent to 2.5% of Indonesia's GDP in 2100 which is four times higher than the average global GDP loss (Leitmann, 2009).

Complicating the challenges facing Indonesia are underlying issues of socioeconomic inequality and poverty. According to Oates (2011, p. 1) vulnerability to climate change and other climate hazards is largely determined by "social and economic factors such as income, access to education and healthcare, and the availability of economic opportunities". This means that even though climate change affects everyone, the poorer parts of the population are likely to suffer most (Olmos, 2001). Indonesia is home to around 240 million people of which 18% live on less than \$1.25 (US) per day (UNDP, 2011). Another indicator of Indonesia's vulnerability is that it ranks number 110 out of 190 countries in the Human Development Index (UNDP, 2015); lower than Malaysia (62) and Thailand (93).

The challenges presented to the Indonesian population and economy have been recognised by the Government with the establishment of the National Council for Climate Change (NCCC) and Indonesian Climate Change Trust Fund (ICCTF). NCCC is the national

focal point of the United Nations Framework Convention on Climate Change. The main objective of this body was to serve as the primary institution for policy coordination on climate change. A financial institution called the Indonesian Climate Change Trust Fund (ICCTF) was established in 2009. The aim of this institution was to address the lack of coordination and, with a small amount of financial assistance from donors, to contribute to mainstreaming climate change issues into government development planning and the implementation of climate change related activities.

In response to the recognised challenges posed by climate change, the Indonesian government developed adaptation strategies to be implemented both at the national and municipal level. In 2012 the government released a strategy for mainstreaming adaptation into national development planning. This marked the first formal response to the potential impacts of climate change that centred on the concept of adaptation. Following this, a national adaptation programme of action (NAPA) called RAN API (Rencana Aksi Nasional Adaptasi Perubahan Iklim) was released in 2014. However, this offered no clear direction or obligations for local municipalities to adopt or mainstream adaptation. The results were that adaptation remained generally poorly understood.

Although there are several progressive local governments in Indonesia that have attempted to mainstream adaptation activities into their development policies (Archer et al., 2014; Archer & Dodman, 2015; Lassa & Nugraha, 2015), little is known about their success in terms of increasing adaptive capacity and community resiliency. The common barriers in encouraging such initiatives among local governments are mostly related to the Indonesia's climate governance such as insufficient capacity, lack of coordination, and the absence of regulation (see Mulyani & Jepson, 2013). In sum, there is a huge challenge for Indonesia government to translate adaptation policy into practice.

1.2 Statement of Problem

Adaptation is most effective when it becomes a mainstream or foundational concept in development planning (Ayers, Huq, Faisal, & Hussain, 2014). As such, mainstreaming adaptation into existing development policies and practices is a core challenge for the Indonesian government and, in turn, regional and local governments. However, numerous commentators have noted that mainstreaming will remove "contradiction between policies as well as internal inconsistencies, realising mutual benefits and making policies mutually supportive" (Collier, 1994, p. 36). Bauer and Steurer (2014) argued that, in practice, mainstreaming adaptation is mainly accomplished through multi-level, interagency coordination and cooperation across the different layers of governments. Some of the identified barriers to mainstreaming adaptation into development planning in developing countries relate to poor coordination and communication, lack of knowledge and political will, lack of financial resources, lack of awareness, insufficient data, and limited institutional capacity (Lasco et al., 2009; Oates, 2011; Sharma & Tomar, 2010; Sietz, Boschütz, & Klein, 2011). Importantly, though, international studies on climate policy integration revealed that there is a deficit of empirical evidence for how mainstreaming can be achieved – particularly in the context of developing countries (Ahmad, 2009; Dupont, 2011; Klein & Juhola, 2014; Sietz et al., 2011; Urwin & Jordan, 2008). In their study on mainstreaming climate change adaptation in the Philippines, for example, Lasco and colleagues (2009) found that climate change considerations were not taken into account in the major development planning programmes. Indeed, in the case of developing countries, mainstreaming is considered a low priority (Huq, Reid, & Murray, 2006). Given developing countries are most at risk of negative impacts of climate change, there is an urgent need to better understand the barriers to the mainstreaming of climate change adaptation into development policies and how these can be addressed.

1.3 Research Objectives and Foci

This research will analyse how the Indonesian government seeks to mainstream adaptation into its development planning agenda. Given that the success of mainstreaming climate change adaptation is heavily impacted by governmental frameworks and resourcing across different scales, this thesis focuses on documenting the approach of the government to coordinate efforts across the different ministries and local governments and identifying barriers to this.

This thesis will interrogate the gap between the extant literature on the mainstreaming of climate change adaptation and the 'reality' of how this is occurring in Indonesia. The factors underpinning mainstreaming adaptation at the national level, municipal level and at the grassroots-level will be investigated. Attention will be given to the specific barriers to mainstreaming, and the strategies governments and organisations used to overcome these. From this, the thesis will develop a framework for guiding the mainstreaming of climate change adaptation into development policy.

The research has five foci. First, the research will identify the organisational characteristics, the processes of involvement, priorities, strategies and programs that national authorities have employed to mainstream climate change issues. Second, it will explore the obstacles faced by local government in seeking to integrate climate change into existing development planning. Third, it will investigate the reasons why some municipalities willingly respond to climate change impacts while others are reluctant to initiate mainstreaming of adaptation. Fourth, it will review the practices and processes that enable communities to adapt to climate hazard based on indigenous knowledge, cultural practices, and social connectedness. The fifth focus is to reassess mainstreaming adaptation in theory, policy, and practice using conclusions drawn from the Indonesian context.

1.4 Research Significance

Given that mainstreaming climate change adaptation into development planning is a new policy area and the success of its implementation will be determined among other things by the ability and capacity of government to design their approach, especially how to increase coordination across sectors and different groups of stakeholders (horizontal linkages) and across multiple governance levels – local, national, regional and global (vertical linkages), this thesis is significant for four reasons:

First, it provides detailed and new information on the Indonesian government's climate change adaptation actions. Indonesia is leading the way amongst developing countries and mainstreaming is now a focus for important international development agencies (World Bank, UNDP, ADB, and UNEP).

Second, it contributes to the Indonesian government's current climate resilience development programmes. There are practical policy recommendations that will come from this thesis, and my previous experience working in climate change policy in Indonesia will facilitate communication and uptake.

Third, the study provides information and ideas for other developing countries currently engaged in developing climate resilience development programs.

Fourth, the study will provide an empirical study on the mainstreaming of adaptation policy. This concept has predominantly been addressed theoretically, and this thesis examines its relevance and details within a developing country context. In particular, this thesis will analyse policy coordination and programs for mainstreaming climate change adaptation into development planning; a new policy direction in developing countries with strong international support.

1.5 Organisation of the Thesis

This thesis is about how adaptation is addressed, incorporated into existing policy, negotiated and implemented at different levels of government. It is composed of nine chapters as follows:

Chapter one is the introduction. This first chapter presents an overview of the main components of the thesis including the background, justification, significance of the research, and chapter organisation.

Chapter two then reviews the literature on climate change policy. The chapter presents the fundamental concepts in climate change literature such as mitigation, adaptation, adaptive capacity, mainstreaming, and multi-level governance theory. This chapter examines the core concept of mainstreaming of adaptation including its significance as well as limitations. This chapter presents multilevel governance theory, mainly focusing on the role of international agencies, national government, and local governments.

Chapter three provides detail about the socio-politic and economic conditions in Indonesia and the potential risks of climate change. It provides information regarding the domestic political system, governance performance, demographic characteristics, vulnerability to climate change impacts, and policy initiatives on climate changes. It also includes a summary of the physical geography of Indonesia relevant for understanding the considerable risk to climate change being faced by large parts of the population. This chapter argues that existing adaptive capacity and vulnerability influence the capacity to mainstream climate change adaptation into development policy. It also makes the case for the focus on Indonesia and the urgent need to broaden in the international scholarship to better incorporate the experiences of developing countries.

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Chapter four focuses on research methodology. This chapter sets out the operational procedures of the research by providing information on research methods, data collection process, and how data were analysed in order to answer the research questions in this thesis.

Chapter five presents the empirical evidence of adaptation strategy at the national level. This chapter aims to evaluate the national adaptation policy formulation, using RAN API as a case. To this end, this thesis draws on the MSIM (Multi-Stakeholder Influence Mapping) framework developed by Sova et al. (2014) and the IIM (Influence Interest Matrices) by Reed et al. (2009). These two approaches are used to analyse the power relationship among the main stakeholders during the formulation of the adaptation policy document thereby providing some information on the existing institutional capacity to successfully manage the climate concerns. This chapter argues that poor climate governance leads to obscure signals in the national adaptation agenda which, in turn, contributes to the slow progress of adaptation uptake at the municipality level.

Chapter six and seven focus on adaptation policy development at the municipal level. These chapters centre on the three issues: the drivers, the barriers, and the effort to overcome such barriers. Chapter six considers why some local authorities aggressively pursue adaptation while others do not. It examines the motives for adaptation uptake. It argues that mainstreaming adaptation at the local level requires a strong mandatory regulation (command and control mechanisms) from a higher authority. If it is voluntary, it is unlikely to work when resources (human and financial) are scarce at the municipal level. Clear guidance in operational levels from central government is crucial for successful climate change adaptation.

Chapter seven discusses the factors that enable municipal governments to initiate adaptation and to build capacity for resilience, arguing that strong commitment from mayors and support from local champions is amongst the most important prerequisites for generating support for adaptation implementation. It is also argued that in cases where the national government provides weak leadership, international development partners can contribute to both providing start-up adaptation funding and expertise that is relatively scarce.

Chapter eight reviews community adaptation pathways in Semarang. It reviews the practices and processes that enable communities to adapt to flooding events based on indigenous knowledge, cultural practices, and social connectedness. This chapter argues that

social capital has a critical relationship to the preparedness of local municipalities to mainstream adaptation to climate change within development policy. It reveals that social capital is a key ingredient in creating a more resilient community, particularly in the context of limited government assistance.

Chapter nine provides an overall conclusion including a synthesis of key findings and recommendations.

1.6 Conclusion

This chapter has provided the context, the problem statements that underlie the significance of the project, and the contribution of this thesis to promote climate change adaptation and resilience. This chapter has highlighted that mainstreaming is an important strategy for achieving climate change adaptation goals. However, the discussion above highlights that there is a lack of empirical evidence on how to integrate adaptation policy into the existing development agenda, how to translate policy into practice, and who should be involved. The adoption of mainstreaming in local governments is the focus of this thesis. The following chapter provides the theoretical foundations for establishing a conceptual framework. This framework will guide the research process to answer the research goals and objectives.

Chapter Two: Literature Review

2.1 Introduction

This chapter will critically examine the literature on climate change policy as it relates to mitigation, adaptation, mainstreaming, and multi-level governance theory. The purpose of this review is to establish a conceptual framework for this thesis. The focus is on eliciting the adaptation experiences and approaches currently being promoted in countries considered to be of 'developing status'. There are three major topics examined in this chapter. First, approaches for managing climate impacts through mitigation and adaptation are examined. Second, the fundamental elements and concepts of climate change adaptation such as hazard, vulnerability, and adaptive capacity are reviewed. In giving particular attention to the historical development of these concepts, a context is established for examining the mainstreaming of adaptation into existing development approaches. Third, multi-level governance arrangements are examined. The focus is on the role of international agencies, the national government, and local governments in inducing grassroots-level adaptation activities. The chapter concludes by explaining the conceptual framework of this thesis.

2.2 Climate Change and Its Impacts

There is a consensus in the international scientific community that climate change will pose a significant challenge to human populations and, if not addressed, lead to a more vulnerable global society at all levels of development (Adger et al., 2007; Agrawala & van Aalst, 2008; Amundsen, Berglund, & Westskog, 2010; Dupont, 2011; Field & van Aalst, 2014). A recent report by IPCC provided an overview of the scientifically projected impacts. These included increasing severity and incidence of heat waves, extreme precipitation events, storm surges, and coastal flooding (Field et al., 2014). The scientific consensus is that there is a changing global climate pattern which is caused by anthropogenic (human) activities through greenhouse gas emissions and land use practices; furthermore, the greatest negative impacts will be felt by individuals living in developing countries and, in particular, in least developed countries (Wheeler, 2014). To address these problems, two major approaches have

emerged: first, mitigation of the impacts and second, adaptation to the (current and future) changing climate (Aakre & Rübbelke, 2010)¹.

Research regarding climate mitigation often highlights the fact that the key point of action is to eliminate the sources of greenhouse gas (GHG) emissions. Definitions generally follow from the IPCC definition where mitigation is defined as "an anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks" (Parry, 2007, p. 878).

While the objective of mitigation is to eliminate the sources or causes of climate change, adaptation refers to addressing its impacts (Burch, 2010). The close relationship between mitigation and adaptation has been stressed in the literature. For example, adaptation programs will potentially necessitate greater investment if a mitigation agenda fails to reduce GHG emissions (Carnesale & Chameides, 2011; Tanner & Mitchell, 2008).

	Mitigation	Adaptation
Target systems	All systems	Selected systems
Scale of effect	Global	Local to regional
Lifetime	Centuries	Years to centuries
Lead time	Decades	Immediate to decades
Effectiveness	Certain	Generally less certain
Ancillary benefits	Sometimes	Often
Polluter pays	Typically	Not necessarily
Actor benefits	Only little	Almost fully
Monitoring	Relatively easy	More difficult

 Table 1: Comparing Characteristics of Mitigation and Adaptation

Source: Füssel (2007)

Füssel (2007) identified several characteristics of mitigation action that are different from adaptation action (summarised in Table 1). The first is that mitigation provides a more "permanent solution", while adaptation is more temporary in nature. For instance, when it has been abated, CO2 cannot cause future damage whereas adaptation needs continual adjustment to current and future risks. The second characteristic relates to the cross-temporal implications of climatic problems. Mitigation benefits are long-term while adaptation benefits

¹ In practice the two responses are complementary, interdependent, and should be pursued simultaneously rather than being mutually exclusive (Füssel, 2007; Harker, Taylor, & Knight-Lenihan, 2016).

involve a shorter term. Once adaptive measures are adopted, they will have effect immediately to alleviate damage. The third characteristic is that mitigation is generally applied at a global level which offers benefits for all whereas adaptation actions are typically limited to a local level with benefits for a specific location.

Traditionally, mitigation has been the primary focus of policy responses to climate change (Burch, Berry, & Sanders, 2014; Füssel, 2007). Effort to reduce greenhouse gases, firstly by issuing regulations for major industrial emitters and secondly by encouraging individuals to change their behaviour to be more environmentally friendly through, for example, reducing vehicle miles travelled and adopting green building technology (Brody, Grover, Lindquist, & Vedlitz, 2010) are some of the best known examples of mitigation policies.

Policy to respond to climate change has, more recently, promoted adaptation processes or mechanisms. Adaptation is often considered as 'an emerging agenda' in climate change literature (Bulkeley & Tuts, 2013; Peltonen, Juhola, & Schuster, 2010). Research on adaptation gained attention during the mid-1990s, as scholars broadened their focus from examining mitigation efforts, practices and policies (Aakre & Rübbelke, 2010; Burton, Huq, Lim, Pilifosova, & Schipper, 2002). In 2001 the IPCC considered adaptation issues more seriously and first provided a definition (Ayers & Forsyth, 2009). The shift in focus was partly due to the slow progress that had been made in the uptake of mitigation practices (Bulkeley & Tuts, 2013) and also an increasing awareness that mitigation programs could have only a limited contribution/effect in reducing greenhouse gasses and the impacts of climate change (Keskitalo et al., 2012). There was still a need to examine policy that could support peoples' livelihoods in the changed climate conditions (McGray, Hammill, Bradley, Schipper, & Parry, 2007).

According to Smit, Burton, Klein, and Wandel (2000) a definition of adaptation can be mapped out from three different components: the subject (inquiries about who or what adapts), the object (what to adapt to), and the way adaptation is practiced (a description of how they adapt).

The subject of adaptation relates to who is adapting to the effects of climate change or the operator of actions. These constitute people (individuals or community) or the structure of the system (local, region, or global dimension), as well as sectors (social and economic) as the receptors of the actions (Eisenack & Stecker, 2012; Smit et al., 2000). The object of adaptation refers to the purpose of initiating adaptation activities. It can be the impacts of, vulnerabilities to, or exploiting opportunities of such changes. The way adaptation is practiced relates to the processes of adaptation that "can be passive, reactive or anticipatory; they can be spontaneous or planned" (Smit et al., 2000, p. 228). The following section will discuss these three components of climate change adaptation.

2.3 The Adaptation Actors: Who and What Adapts

Acknowledging that climate governance is deeply fragmented in terms of actors and institutions (Termeer, Biesbroek, & van den Brink, 2011), researchers argue that actors must work across sectors and jurisdictions to achieve more effective outcomes. In practice, this is mainly accomplished through multi-level, inter-agency coordination and cooperation. This includes bringing together the actors and resources of the different layers of government at national, provincial (or state/ regional), and local (or county/ town) levels (Bauer & Steurer, 2014). Researchers have argued that these relationships can be fostered under the banner of connectivity (Termeer et al., 2011), multi stake holder partnership (Backstrand, 2006), meta governance (Bell & Park, 2006; Christopoulos, Horvath, & Kull, 2012), multi-level governance (Dąbrowski, Bachtler, & Bafoil, 2014; Stephenson, 2013), a multi-stakeholder platform (Djalante, 2012; Warner, 2006), environmental policy integration (Runhaar, Driessen, & Uittenbroek, 2014), deliberative governance (Vink et al., 2015), collaborative governance (Ansell & Gash, 2008), and adaptation partnerships (Bauer & Steurer, 2014).

However, it should be noted that the involvement of a diversity of players can bring negative impacts such as inefficiency in resource utilisation, diverse opinions that at times are opposed to each other, and potentially a postponement of action (Pahl-Wostl, 2009; Termeer, Dewulf, & Breeman, 2013). Blythe, Murray, and Flaherty (2014, p. 1) describe the challenges of mainstreaming adaptation as a "wicked" problem, that is "difficult to define, vary depending on perspective, and cannot be solved absolutely the way a math problem can be solved but rather tends to reappear". In theory, an entire nation's adaptive capacity can be enhanced when government institutions operate collaboratively at a national level (Bruneniece & Klavins, 2013). The groups important to underpinning effective collaborative government are: different levels of political government including national and sub-national

parliaments, policymaking agencies operating across sectors at different levels, scientific and educational research institutions particularly those with interdisciplinary programs, private sector organizations, particularly those involved in the climate proofing infrastructure development and services, civil society and community-based organizations, and international organizations (Anbumozhi, Breiling, Pathmarajah, & Reddy, 2012; OECD, 2009). The roles of various levels and actors are crucial to this thesis as it lays the foundation that is used to answer the research questions.

Recent studies (Aall, Carlsson-Kanyama, & Hovelsrud, 2012; Anguelovski & Carmin, 2011; Jordan & lenschow, 2009) have shown the important role of the national government in providing regulations and guidance. However, importantly, the fact that a government has a national-level adaptation policy does not mean that local-level implementation will be an outcome. An "institutional void", where the roles and responsibilities of actors are unclear, has been identified as a cause of delay or inefficiency in implementing national adaptation policies (Measham et al., 2011, p. 891). Studies on adaptation actions at the national level, for example, have highlighted that often such policies (see for example Biesbroek et al., 2011). Shi, Chu, and Debats (2015) argue that the presence of adaptation policies at a higher authority level is not a strong predictor for municipalities doing the same thing. Relatedly, Baker, Peterson, Brown, and McAlpine (2012, p. 128) found that for developed countries, adaptation measures are perceived as "beyond the capacity of many local governments".

When the national impetus is weak regarding supporting adaption measures at the local level, researchers have identified that external actors, such as non-government organisations (NGOs), can play a vital role. International development agencies, NGOs, representative organisations, associations of city governments and universities provide expertise, access to funding, and broader networks that are often necessary to both understanding factors underpinning vulnerability and also identifying and pursuing suitable approaches for adaptation. Such collaboration can also help increase the legitimacy of local adaptation strategies (Wejs, Harvold, Larsen, & Saglie, 2014).

The role of international donors, who often work through international development agencies or NGOs, has been recognised as valuable in supporting effective local adaptation

efforts (Anguelovski et al., 2014; Lasco et al., 2009). International donors are an important funding source for local adaptation (Carmin, Anguelovski, & Roberts, 2012). Tillema, Mimba, and Van Helden (2010) found that channelling funds directly to local-level projects rather than through the national government is usually preferable to avoid 'bottlenecks' and 'red tape'. Research on climate practices in Latin America and the Caribbean suggests that the role of higher authorities and transnational entities cannot be ignored (Hardoy & Lankao, 2011). For instance, a community-based environment management committee in Ilo, Southern Peru, worked closely with, and received assistance from, the local municipality, the provincial government, and donors to improve their residential areas with green spaces and sanitary services (Palacios & Sara, 2005).

Lassa and Nugraha (2015) found that international donors working through international development agencies or NGOs could effect greater impact if there were good enablers such as political champions and shadow organisations at the local level. In Indonesia, for example, NGOs serve as 'intermediaries' between local leaders and marginal populations as well as between international and local actors (Aspinall, 2013). Lasco et al. (2009, p. 144) argued that international actors can help to "jump start mainstreaming" by providing financial assistance as a stimulant for policy uptake. But it has to be emphasised that these interventions are only possible through collaborative efforts with local government (OECD, 2009). That noted, Larson and Ribot (2009) have warned of the disadvantages of NGO's roles in project-based funding, such as those driven by foreign aid, as these can generate short-term actions that erode capacity and sustainability.

In research examining adaptation to climate change, the crucial role of local governments in climate adaptation is widely acknowledged (Grothmann & Patt, 2005; Keskitalo, 2010; Walker, Adger, & Russel, 2014; Wamsler and Brink, 2014). This is not surprising given that the direct impacts of climate change manifest at the local level (Næss, Bang, Eriksen, & Vevatne, 2005). Adaptation strategies are, therefore, often site specific (Sathaye et al., 2007) and "place dependent" (Armah, Luginaah, Hambati, Chuenpagdee, & Campbell, 2015, p. 11). Villages and communities experiencing the effects of climate change have been described "as important laboratories for climate change action" (Rosenzweig, Solecki, Hammer, & Mehrotra, 2011, p. xxii). Rosenzweig et al. (2011, p. xxii) draw attention to the need to consider local level capacities to address the potential barriers to adapt to climate change (see also Alam & Bahauddin, 2014; Bulkeley & Betsill, 2005). The

challenge is that approaches may differ among local governments. Local governments have different backgrounds in terms of their geography, organisational/administrative structures, capacities and goals. These diversities, in turn, will influence their ability to anticipate and cope with the impact of climate change.

The discussion above indicates that adaptation needs to be formulated deliberatively by a wide range of stakeholders from different levels of authority. Institutional fragmentation and complexity as the inherent characteristic of climate governance makes adaptation actions more difficult. The literature in this section implies that in order to make adaptation effective, coordination across the different layers of governments is crucial.

2.4 Climate Change Adaptation in Practice

Researchers have identified two types of adaptation practices: hazard-based and vulnerability-based approaches (Carmin, Dodman, & Chu, 2013; Lazarević-Bajec, 2011). While the hazard approach mainly focuses on physical conditions such as watersheds, ecosystems, irrigation projects, buildings (Dessai & Hulme, 2004) and options to address them (Noble et al., 2014), the vulnerability-based approach is concerned with the social elements that influence adaptive capacity such as the socio-economic and political conditions in a society (O'Brien & Leichenko, 2000). The boundary between these categories is not clear cut, and each type recognises that to some degree both climate exposure and socio-economic vulnerability determine the level of climate impacts (Carmin et al., 2013). Beyond these two approaches, Haque and Etkin (2007) propose a risk-based approach; this involves a mixture of social and technocratic elements that might offer a better outcome. The present thesis argues that this risk-based approach is important in adaptation as it emphasises "that understanding and using human and societal dimensions is equally or more important than trying to deal and control nature through the use of technology" (Haque & Etkin, 2007, p. 271)

The hazard-based approach is characterised by giving attention to the incremental impacts of climate change and relies on climate model projections (Füssel, 2007). This is especially important to increase awareness, develop priority areas of actions, and is arguably appropriate for long-term policy planning (Lazarević-Bajec, 2011). This approach is useful for conducting discrete climate specific adaptation (stand-alone adaptation). For example, it

has been predicted that there will be problems involving the lack of clean water in Melbourne due to low yearly rainfall average. This has become the concern of local government and they propose to build a desalinisation plant and pipeline project to transport water from the northern Victoria irrigation renewal project to Melbourne (Barnett & O'Neill, 2010). A hazard-based approach would enable better future climate scenarios (Carmin et al., 2013). However, climate projections cannot be used immediately for designing adaptation policy due to their lack of practical applicability and evidence due to their long intergenerational time frame (Dessai & Hulme, 2004; Füssel, 2007) as well as a lack of accuracy on a spatial level due to large/global dimension of its climate change scenario (Burton et al., 2002). An empirical study regarding the impact of climate change on water supply and demand in the U.K. demonstrated that climate projection plays a minor role among water companies (Subak, 2000). In addition, hazards-based assessments can be maladaptive if they do not sufficiently account for other options (Noble et al., 2014). In the case of water management in Melbourne, Barnett and O'Neill advise policymakers that the failure to choose the best adaptation strategy can lead to maladaptive practices. Instead of assisting adaptation to future threats, these adaption measures could increase the vulnerability of other systems, sectors, or communities when "they increase emissions of greenhouse gases, disproportionately burden the most vulnerable, have high opportunity costs, reduce incentives to adapt, or set paths that limit the choices available to future generations" (Barnett & O'Neill, p. 212).

The vulnerability-based approach pays explicit attention to understanding "existing social and economic conditions and extrapolating how future shocks and stresses as a result of climate change will negatively affect these conditions" (Carmin et al., 2013, p. 14). Vulnerability assessments are usually based on several determinants such as human resources (dependency ratios and literacy rates), economic capacity (market GDP per capita and income distribution) and environmental capacity (population density, carbon dioxide emissions, percentage of unmanaged land) (Pelling, 2010). The advantage of this approach is that it does not require firm climate predictions (Lazarević-Bajec, 2011) and past conditions of extreme events (Pelling, 2010). Instead, it relies on knowledge about the context of socioeconomic, political, and institutional conditions of societies (O'Brien, Eriksen, Nygaard, & Schjolden, 2007). This approach is suitable if resources (in terms of data, expertise, time, and money) are limited, there is a short-term planning horizon, and the interaction with non-climatic stressors (Füssel, 2007) that are frequently reported as happening in developing countries (Carmin et al., 2013; Füssel, 2007; Lazarević-Bajec, 2011).

This approach is argued to help local policy makers to "determine the relevance and relative priority of climate change within the context of other local functions and responsibilities, and to identify adaptation responses that are consistent with other environmental or socioeconomic pressures and development plans" (Reisinger, Wratt, Allan, & Larsen, 2011, p. 310). As people also face multiple stressors beside climate change, vulnerability reduction programs involving poverty alleviation and improving nutrition are good examples of increasing adaptive capacity (to cope with the impacts of climate change) (Agrawala & van Aalst, 2008). Vulnerability can also be reduced by upgrading the living conditions of societies (Klein, 2011). Other examples include:

- In Africa, efforts to reduce vulnerability have also commenced through disaster-risk management, adjustments to technologies and infrastructure, ecosystem-based approaches, basic public-health measures, and livelihood diversification;
- In Europe, adaptation planning has been integrated into coastal and water management, environmental protection, land planning, and disaster risk management; and
- In Asia, Asian Cities Climate Change Resilience Network (ACCCRN) has initiated mainstreaming climate adaptation action into subnational development planning including integrated water resources management, agroforestry, coastal reforestation of mangroves and early warning systems (Field et al., 2014).

However, integrating adaptation into ongoing policy planning requires a more holistic approach than stand-alone adaptation (Ayers & Huq, 2009). The coordinating process among different organisations has proven challenging and "may often stumble on existing turf battles" (Gupta, 2010, p. 90).

Similarly, McGray et al., (2007) argue that there are three ways in which adaptation interventions may be implemented: (1) by achieving development objectives that accidentally contribute to adaptation (serendipitous) (2) by mainstreaming into the existing development planning (climate proofing), and (3) by initiating activities specifically for the purpose of achieving adaptation objectives (discrete adaptation). These approaches can "provide the policy makers with policy choices, an analysis of the rationale of alternative policy choices, and additional information upon which they can base their judgements" (Burton et al., 2002, p. 156). These responses may include changes in public policies or institutional structures, investment in infrastructure and technologies, and behavioural changes (Adger, Paavola,

Huq, & Mace, 2006). How adaptation policies are planned and implemented then "depends on the underlying philosophy or paradigm, which varies between countries" (Biesbroek et al., 2010, p. 443).

2.5 The Way to Adapt

The responses to climate change impacts can be typically divided into two types: short or mid-term coping adjustments and long-term adaptation mechanisms (Aßheuer, Thiele-Eich, & Braun, 2013; Birkmann et al., 2013; Braun & Aßheuer, 2011). Keck and Sakdapolrak (2013, p. 10) note that "the rationale behind coping is the restoration of the present level of well-being directly after a critical event" while "adaptation is geared toward incremental change, and serves to secure the present status of people's well-being in the face of future risks". The capacity of communities' coping capacities are influenced by many factors such as livelihood structure, community structure, social groups, household structure, age, ethnicity, historical time and physical/psychological health (Pelling, 1998).

Eisenack and Stecker (2012, p. 10) argue that "an adaptation is reactive when it is intended to have effects in the present, and is anticipatory when it is planned to come into effect only in the future". To be anticipatory, adaptation strategies need knowledge about the current situation and historical reviews of the past climate change data as well as its future prediction. Vulnerability to non-climate factors such as poverty, lack of knowledge on adaptation options, risk perception, weak institutions, insufficient funds, and competing interests to address more immediate problems related to underdevelopment are also included in considerations of adaptation because these issues reduce the capacity of people to adapt (Klein & Juhola, 2014; Sherman & Ford, 2014).

Adaptation here differs from coping strategies that refer to "adjustments people make to deal with existing weather stressors" (Morss, Wilhelmi, Meehl, & Dilling, 2011, p. 3). Adaptation involves long-term considerations; that is, the systematic building of resilience, deeper transformations, and it can help achieve other goals as well as being used for climate change purposes. It therefore has strong connections to sustainable development issues (Dilling, Daly, Travis, Wilhelmi, & Klein, 2015; Moser & Ekstrom, 2010). Numerous authors have pointed out that stand-alone adaptation options are less effective due to limited resources and institutional constraints (Klein, Schipper, & Dessai, 2005). Incremental approaches, therefore, are considered as the most appropriate choice for adaptation. To this end 'no regrets' investments, which result in benefit regardless of whatever the future scenario of climate change, are seen as an essential stepping stone (Linnenluecke, 2013; Mitchell, Tanner, & Wilkinson, 2006).

The discussion above has demonstrated that there are different types of adaptation processes. However in practice, the different types of adaptation are often difficult to distinguish. As Burley, McAllister, Collins, and Lovelock (2012, p. 582) noted "adaptation measures are characterised as anticipatory or reactive depending on their timing. However, given the continuous nature of climate change and adaptation, there is uncertainty surrounding timing and thus a mix of anticipatory and reactive responses are undertaken".

2.6 The Emergence of the Adaptation Agenda: What it Means for Policymakers

Researchers have identified that for adaptation measures to be effective they must directly respond to the impacts and risks from climate change (Carmin et al., 2012; Tol, Fankhauser, & Smith, 1998). Consequently, an evidenced understanding of the impacts and risks posed by climate change is necessary for informing decisions about the more immediate adaptation needs (ADB, 2005).

The impacts resulting from climate change are not equally shared among people or groups. As such, the concept of vulnerability has emerged as a key component when developing adaptation strategies and programs (Hansjürgens & Antes, 2008). Vulnerability is "the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes" (McCarthy, 2001, p. 6). The recent report of IPCC AR5 defines vulnerability as a function of sensitivity and adaptive capacity (Field et al., 2014). In this regard, vulnerability assessment is important to understand "where, how, and why certain regions or groups are vulnerable to climate change" (O'Brien, Sygna, & Haugen, 2004, p. 26). As vulnerability is constantly changing and evolving, efforts to monitor and assess changes must be ongoing (Ziervogel, Bharwani, & Downing, 2006). As such, an important function of governments is to identify risks as they emerge and implement strategies or programs to then minimise these risks (Celliers,

Rosendo, Coetzee, & Daniels, 2013). This role for governments can be addressed, in part, through development planning (Carmin et al., 2012).

When evaluating vulnerability, socio-economic conditions need to be taken into account. It has been pointed out that this is particularly the case in developing countries (Kaján & Saarinen, 2013). Ayers (2011, p. 62) argued that "vulnerability is compounded by limited resources, inadequate infrastructure, and weak and ineffective systems of governance". The vulnerability of populations in developing countries is heightened due to their greater reliance on climate sensitive sectors, geographical location, low incomes, and, therefore limited adaptive capacity (Heltberg, Siegel, & Jorgensen, 2009; Mimura, 2010).

The identified issues of heightened vulnerability and reduced adaptive capacity of populations in developing countries raises issues of justice and unfairness because these populations have contributed less that developed countries to GHG emissions as a causal factor of climate change (Harris & Symons, 2010; Tanner & Allouche, 2011). As previously noted, the impacts of climate change, directly or indirectly, are felt quite severely by those in developing countries because of the inadequate infrastructure system and ineffectiveness in climate policy development and implementation (Laukkonen et al., 2009). This implies that the costs of climate change will potentially derail recent development and poverty eradication which, in turn, threatens the achievement of the Millennium Development Goals (Anbumozhi et al., 2012; Tanner & Allouche, 2011). It is therefore not surprising that many studies within adaptation science call for "a fair international regime that would simultaneously prevent dangerous climate change and protect people's right to move out of poverty" (Tanner & Allouche, 2011, p. 2). In this way, international institutions are compelled to provide assistance such as mitigation and adaptation finance (Harris & Symons, 2010; Huq, 2011).

The main points derived from the above discussion lead to the conclusion that the vulnerability paradigm is a critical component in designing adaptation strategies. This implies that decision makers need reliable vulnerability assessments for formulating, implementing and monitoring adaptation-related policies. The absence of detail regarding vulnerability assessment makes it difficult for local development planners to determine effective adaptation programs. However, it is usually beyond the local officers' capacity to conduct such assessments. The assistance from donors is necessary - especially in relation to providing expertise and funding.

2.7 Institutional Arrangements Supporting Mainstreaming Adaptation Measures into Development Policies and Programs

Researchers considering the role and nature of adaptation policies and programs have identified that an important trigger for initiating adaptation is the experience of extreme, frequent local calamities (Anguelovski et al., 2014; Biesbroek et al., 2011; Mickwitz et al., 2009). However, they also recognised that for governments to effectively support adaptation programs, the concept of adaptation needs to be "mainstreamed" into existing development planning (Ayers et al., 2014). In effect, the planning process needs to ensure that the necessary resources for adaptation are available prior to communities experiencing extreme calamities. The core focus of recent studies on adaptation has been how to "mainstream" adaptation into existing development planning processes and practices.

Mainstreaming was first used in the policy areas of gender, health, and then sustainable development (Geyer & Lightfoot, 2010). Scholars have also explored how to incorporate environmental problems into existing policy planning, focused on the concept of Environmental Policy Integration (Rauken, Mydske, & Winsvold, 2015; Uittenbroek, Janssen-Jansen, & Runhaar, 2013) In this context, scholars have identified a wide array of benefits of mainstreaming including: cost effectiveness, improving the quality of decisions, and encouraging technological innovations (Alam & Bahauddin, 2014; Shemdoe, Kassenga, & Mbuligwe, 2015). Collier (1994, p. 36) also found that, from a public policy point of view, mainstreaming removes "contradiction[s] between policies as well as internal inconsistencies, realising mutual benefits and making policies mutually supportive".

In recent years, there has been an increase in the number of published papers reporting on mainstreaming in the context of climate adaptation policy. This work has examined the issue from different perspectives including: community-based programs (Regmi & Star, 2014; Reid & Huq, 2014) leadership (Meijerink & Stiller, 2013); tool development (Benson, Twigg, & Rossetto, 2007; Gupta et al., 2010; Lebel et al., 2012); developing countries (Lasco et al., 2009; Oulu, 2011; Pasquini, Cowling, & Ziervogel, 2013; Sietz et al., 2011); least developed countries (Alam & Bahauddin, 2014; Ayers et al., 2014; Saito, 2013); developed countries (Juhola, 2010; Rauken et al., 2015); the agriculture sector (Stringer et al., 2009); the water sector (Brouwer, Rayner, & Huitema, 2013); technology (Haddad & Shideed, 2013); evaluation procedures (Picciotto, 2002); barriers (Nunan,

Campbell, & Foster, 2012; Pasquini et al., 2013); adaptation-mitigation linkages (Kok & de Coninck, 2007); urban/cities areas (Sharma & Tomar, 2010); disaster risk reduction (Ogallo, 2010); and energy (Solorio, 2011).

However, mainstreaming also has its critics. Mainstreaming opponents warn of challenges such as 'mainstreaming overload', poor coordination and cooperation, lack of communication and misunderstanding, and mismatches between climate change and sectoral concerns (Kok & de Coninck, 2007). Empirical studies have also revealed a range of barriers to successful mainstreaming either related to climate or non-climate problems. These include institutional, cognitive, and socio-cultural barriers as well as contextual factors (Biesbroek et al., 2011; Burch, 2010; Pasquini et al., 2013). It has been found that cognitive elements such as "people's knowledge, understanding, beliefs and attitudes regarding climate change and the environment play an important role in their willingness to adapt" (Pasquini et al., p. 228). Based on empirical evidence from urban Germany and rural Zimbabwe, Grothmann and Patt (2005) report that cognition influences people's failure to adapt. Previous work has also suggested that regulatory and institutional factors ("how the organisation and structure of interactions influence how individuals are allowed to adapt to climate variability and change" (Raymond & Robinson, 2013, p. 104) can hinder effective reduction to climate risk. The capacity of government organisations in terms of human, financial, and technical knowledge to respond to climate change problems are key determinants of what actions are taken (Pasquini et al.,). It has been observed, as another example, that sectoral compartmentalization and policy silos may serve as a barrier to coordination among decision makers in Kenya (Oulu, 2011). Similarly, empirical evidence from coastal Tanzania has demonstrated that sociocultural/socio-demographic attributes such as poverty, social status, educational attainment, employment, income, cultural norms, and religion are closely interlinked with barriers to climate change adaptation (Armah et al., 2015). Another drawback of mainstreaming is that "implementation of climate-adaptation responses is erratic because climate adaptation has to be continuously reframed in order to link to the existing policy objectives" (Uittenbroek, Janssen-Jansen, Spit, Salet, & Runhaar, 2014, p. 1045). The authors further propose an alternative conceptual lens called "dedicated approach"; that is, "... based on direct political commitment to climate adaptation, implies political agenda setting, resource allocation, and clear policy objectives which are expected to facilitate rapid implementation due to political pressure and new structures" (Uittenbroek et al., 2014, p. 1043).

Notwithstanding such debates and warnings, it is widely accepted that mainstreaming is an essential component for climate change related activities (Ahmad, 2009) with a close relationship between adaptation and development articulated across the literature (Ayers et al., 2014). To ensure successful mainstreaming, several studies have identified that investments that generate 'net social benefit' need to be prioritised (ADB, 2005; Heltberg et al., 2009). For example, the establishment of buffer zones which can be either natural (such as mangrove forests) or other buffer zones which need protection from flooding, abrasion, and storm surges. These buffer zones can benefit the ecosystem and reduce climate vulnerability at the same time (Linnenluecke, 2013). For example, the establishment of natural buffer zones like mangrove forest areas in Semarang, Indonesia, not only provides soft barriers and protection from abrasion and sea level rise, but also increases fish productivity as well as bringing other ecosystem benefits (Prihantoro, 2010). Other examples of strategies that generate co-benefits include energy efficiency and cleaner energy of transportation and residential water cycling (Field & van Aalst, 2014).

Research on merging development planning and disaster risk reduction planning also provides insights into what makes mainstreaming 'successful' (Dilling et al., 2015). Such integration reduces duplication and leads to more efficient resource allocation (Uy & Shaw, 2010) which attracts political support (Mitchell et al., 2006). As the policy horizon of climate change is usually for a longer period than the political lives of policymakers (Casado-Asensio & Steurer, 2014; Fröhlich & Knieling, 2013), they are unlikely to pursue high-cost adaptation measures without convincing reasons (Masters & Duff, 2011; Vink, Dewulf, & Termeer, 2013). For example, Baker et al., (2012) describes a study in Southeast Queensland where a lack of political support hindered adaptation measures as decision makers preferred short-term priority actions (Baker et al., 2012). It makes sense then that adaptation strategies are more likely to be adopted if they also promote short-term returns such as economic benefits; for example, reducing energy costs (ADB, 2005), investment in an early warning system, enforcement of building codes, better land use planning, or improved ecosystem management and restoration (Dilling et al., 2015).

There remains a gap in the adaptation research, particularly in developing countries, on the relationship between climate change and its impact in sectoral and local areas (Hulme, Neufeldt, & Coyler, 2009). Several authors have pointed out that while attention on climate adaptation is growing, the empirical studies on the barriers and successful strategies are

lacking (Antwi-Agyei, Dougill, & Stringer, 2014; Burch, 2010; Pasquini et al., 2013). Organisational arrangements that inhibit implementation (Nunan et al., 2012) and real interventions on how to overcome barriers are limited (Biesbroek et al., 2013). While Leck and Roberts (2015) identify the need to understand the role of informal/shadow systems in municipal institutions, Rauken et al. (2015, p. 14) emphasise the need to answer the question of "how the central level can motivate and ensure adaptation work and mainstreaming at the local level without micromanaging it". Vogel and Henstra (2015) argue that there is relatively little research on the operationalisation of adaptation policy as a unit of analysis (goals, targets, instruments, and agents). Insufficient empirical examination exists on how mainstreaming is institutionalised, what steps are taken, and what are the enabling factors for success (Anguelovski et al., 2014; Oulu, 2011). Furthermore, there is a paucity of research on how the mainstreaming of adaptation can be replicated in other municipalities beyond the fore-runners (Koch, 2016).

To date, there is a well-developed body of research on adaptation to climate change in developed nations (see for example: Ford & Ford, 2011) and low-income countries who have received international adaptation funds (Ford et al., 2015). However relatively fewer studies have been done in middle-income countries (for example in North Africa and Central Asia) (Berrang-Ford, Ford, & Paterson, 2011; Ford et al., 2015; Nath & Behera, 2011).

The conspicuous gap in the literature implies the need to investigate how mainstreaming plays out in the actual practices in the national and municipal development arenas. This thesis aims to add much needed research by conducting a project based on the experience of Indonesia (a middle-income country) in mainstreaming and implementing adaptation. The study focuses on policy application at a national, municipal, and grass-root level.

2.8 Conceptual Framework

The concept of MLG is important for understanding how the mainstreaming process is working. As highlighted previously, the impacts of climate change will be experienced at multiple spatial, temporal and socio-political levels (Adger, Eakin, & Winkels, 2009) and as such they require responses at all levels of government (Amundsen et al., 2010). MLG can be defined as "decision- and policy-making that involves multiple actors and takes place across multiple jurisdictions and sectors" (Fidelman, Leitch, & Nelson, 2013, p. 800). In MLG the concept of interplay or level is central (cf Fidelman et al., 2013; Termeer, Dewulf, & Lieshout, 2010). According to Termeer et al. (2010, p. 5), there are three key elements in the shifting role of government and the re-positioning of state power and control: (1) upwards to international actors and organizations, (2) downwards to regions, cities, and communities, and (3) outwards to civil society and non-state actors. This means that MLG "questions the dominance of traditional 'top-down' analysis of climate change, and environmental governance in general, and proposes that climate change policy can and should be regulated at multiple levels of governance (Harker et al., 2016, p. 3). Due to the fragmented nature of climate change governance, coordination to obtain policy coherence is a key concept for effective adaptation actions (Mickwitz et al., 2009).

MLG provides a useful analytical framework for analysing the relationship between different levels of government and a variety of stakeholders in adaptation (Koch, Vogel, & Patel, 2007). This thesis builds on the MLG framework. The concept and research of governance is still a nascent domain, particularly in hazards and disasters policy, domain (Raju & Becker, 2013). This thesis therefore fills this knowledge gap because it analyses the multiple linkages across governmental bodies and involves a variety of non-state stakeholders.

Figure 1 presents the conceptual framework of this thesis. Based on the previous discussion, there are two major ways to adapt to climate change: planned and spontaneous. While spontaneous or autonomous adaptation happens without government assistance, planned adaptation is mostly to be done by governments. Autonomous adaptation is initiated by individuals, organizations and private sectors. Planned adaptation is usually undertaken by the government through mainstreaming it into the ongoing development planning. In practice, the distinction between autonomous and planned adaptation can be unclear.

Figure 1 Conceptual Framework



This thesis aims to analyse Indonesia's adaptation policies at the national, district and community level using multi-level governance theory. Mainstreaming is most effective when it involves the actors and resources from the different layers of government at national, provincial and local levels, international development partners, NGOs, and academics, the so-called multi-level governance.

The national level is important for many reasons; for example, establishing regulation, providing financial incentives, encouraging information sharing, and handling cooperation with international partners. The national government has also significant role in providing regulations and guidance. Regulation at the national level is critical to secure mainstreaming. Besides that, the national authority have the responsibility of facilitating adaptation in lower-tier governmental organisations through coordination both horizontally and vertically. These responsibilities lead to research questions how Indonesia's central government designs its National Adaptation Strategy, and what the fundamental challenges and the existing of organisational structures constrain mainstream climate change adaptation over a wide array of sectors.
Given that the direct impacts of climate change manifest at the local level, adaptation would be best implemented at this level. However, local governments have different backgrounds in terms of their geography, organisational/administrative structures, capacities and goals that will influence their ability to anticipate and cope with the impact of climate change. This raises questions about why some municipalities willingly respond to climate change impacts while others are reluctant to initiate adaptation.

Within the adaptation policy literature, some barriers to mainstreaming adaptation into local development policies in developing countries relate to poor coordination and communication, lack of knowledge and political will, lack of financial resources, lack of awareness, insufficient data, and limited institutional capacity. This thesis will explore the obstacles faced by local government in implementing adaptation policies. Moreover, as climate change impacts are likely occurring at the household and community levels, this thesis will also review the practices and processes that enable communities to adapt to changing environment.

2.9 Conclusion

This chapter has reviewed the existing literature on climate change issues and the relevance of existing policy options for adaptation purposes. The chapter has explored the fundamental elements and concepts of climate change adaptation and discussed the gap in the literature. Thus, this chapter has provided the rationale behind the research questions and has located the thesis in the current adaptation issues.

This review of the literature identified the key research issues. The first issue related to the clarity of the role of central government - how they (central level) can encourage and ensure mainstreaming adaptation works at the local level given the lack of resources. Drawing on the literature, it was argued that strong central level involvement is important, while the absence of a detailed and clear adaptation strategy at a national level may lead to the delay in local actions (Aall et al., 2012). The second issue related to the issues of the 'how' of mainstream adaptation at the local level. The extant literature revealed that adaptation would be best implemented at the local level where actual impacts of climate change were often most apparent (Laukkonen et al., 2009). However, research has also shown that these local arenas are often handicapped by resource constraints and weak institutional capacity (Anguelovski, Chu, & Carmin, 2014). At the same time, the local

capacity for adaptation does not occur in a political vacuum but is influenced by the interactions with higher levels of government, civil society, businesses and international institutions (Benz, Kemmerzell, Knodt, & Tews, 2015; Eakin & Lemos, 2006).

The following chapter provides an overview of biophysical aspects, socio-economic conditions and the governance system in Indonesia. Extending on the themes developed in Chapter Two, the following chapter also provides a more detailed description of the risks and vulnerabilities that may influence the mainstreaming of adaptation in development policies in the contemporary Indonesian context.

Chapter Three: Historical Background and Climate Change Policy Initiatives in Indonesia

3.1. Introduction

This thesis is investigating the processes underpinning, and barriers to, the mainstreaming of adaptation approaches in development policy in the context of developing countries. Specifically, the thesis focuses on a case study of Indonesia. This chapter provides an overview of Indonesia's biophysical character and contemporary socio-economic conditions and governance system. An understanding of Indonesia's physical and socio-political geography is critical for interpreting the diverse nature of challenges presented by climate change – both in terms of impacts and responses by government and susceptible populations.

This chapter is structured into two substantive parts. Part one provides information on geographic location, history, demographic characteristics and political system. Part two outlines the nature of climate change risks facing the Indonesian population and strategies and policies that have been used for managing the potential risks of climate change.

3.2 Part One: Historical Background - Socio-Political Systems

The word Indonesia derives from the words "India" and "Nesos" (meaning 'island' in Greek), so this term refers to "Indian islands" - reflecting how European scholars described an archipelagic country in South East Asia that has a similar culture to India (Brown, 2003). Indeed, in the year 1850, the term "India" was used by orientalists to distinguish the region from the areas now called Pakistan (Robinson, 2014). Situated at the equator with more than 16,000 islands (of which 6,000 are inhabited), Indonesia has great diversity in cultures and geographic conditions. Culturally, it is characterized by ethnic diversity in languages, dialects, religions and customs. One study identified the existence of 580 dialects and languages (Lamoureux, 2003) spoken by 300 major ethnic-tribal populations (Wiryomartono, 2014). The largest ethnic groups are the: Javanese (41.71%); Sundanese (15.41%); Malay (3.45%); Madurese (3.37%); Batak (3.02%); Minangkabau (2.72%); and Betawi (2.51%) (Carnegie, 2010). At a national government level, to manage such diversity and complexity presents an enormous challenge (Carnegie, 2010). Even though Islam is the largest religion (85%) followed by Christianity (11%) and Hinduism, Buddhism, and Confucianism (4%), the largest political parties are secular (Blöndal, Hawkesworth, & Choi, 2009). As the world's

largest Muslim country, Indonesia has been cited as a model of rare democratic transition and consolidation (Mietzner, 2012; Webber, 2006).



Figure 2: Map of Indonesia

(Source: adapted from Lamoureux, 2003)

Indonesia is a unitary state with a hierarchical administrative structure divided into a central or national government at the top level and sub-national governments below. Sub-national consists of provinces (led by governors) at the second tier. At the third tier, or municipal level, there are two different forms of administration: Kabupaten (rural districts) headed by Bupati and Kota (urban municipals) led by a Mayor (walikota). Each municipal contains Kecamatans (sub-districts) which are further divided into Desa (for kabupatens or villages) and Kelurahan (for urban municipals). Desa and Kelurahan are the lowest formal level of governmental administration; however, even below Desa and Kelurahan there can still be hamlets (Rukun Warga) and neighbourhoods (Rukun Tetangga)². Currently, Indonesia has 34 provinces, 415 regencies, 93 cities and 77.961 villages³ (this does not include one administrative regency and five administration cities in the capital city of Jakarta).

² In this thesis the terms national and central government are used interchangeably. The terms districts, cities, municipalities or local governments are also used interchangeably to refer to administrative governmental structure below provincial level.

³ Data retrieved from the Interior Ministry Website http://otda.kemendagri.go.id/images/file/data_dan_informasi/seputar_otda/total_daerah_otonom.pdf, accessed on 8/10/2016

3.2.1 Demographic Overview

Indonesia is one of the world's most densely populated countries, with an estimated total population of over 249.9 million in 2013⁴. Indonesia ranks number 110 out of 190 countries in the Human Development Index (UNDP, 2015) with 18% of the population living on less than US\$1.25 per day (UNDP, 2011). Java Island is the most densely populated island and is where 30% of the population live (Tsamenyi, Noormansyah, & Uddin, 2008).

The agricultural sector, which accounts for about 25% of the country's 200 million hectares of land territory, has a major role in the livelihoods of the population and accounts for approximately 15.4% of the GDP (Anggarendra et al., 2016).

3.2.2 The Domestic Political System

The development and political context for the analysis of Indonesia's climate policy process started after the Japanese surrendered in 1945. At this time Sukarno, the first president of Indonesia, declared independence. Indonesia had a long history before its proclamation of independence. Indonesia shifted from a culturally and politically diverse set of sultanates in the 13th century to 350 years of Dutch control (Lamoureux, 2003). Dutch ships sailed into Indonesia for the first time in 1595 (Taylor, 2003). The Dutch gained complete control of contemporary Indonesia (excluding Timor Leste) in 1908. The timeline of important Dutch occupation was—Ambon (1605), Batavia (1619), Banda (1621), Kai and Aru (1623), Melaka (1641), Tanimbar (1646), Tidore and Kupang (1657), Makasar (1669), Minahasa (1679), and, after 1680, Tegal, Semarang, Jepara, Rembang, and Surabaya (Taylor, 2003) and finished expansion in early 20th century in Aceh in 1908 (Phillips, 2005). Vu (2010, p. 53) described the institutional development during Dutch colonialism thus: "Dutch rulers united scattered islands, transformed numerous sultanates into districts and provinces under a central government, built a modern bureaucracy that reached deeply into native society, and established a limited modern educational system"

Dutch colonial rule ended in 1942 when the Japanese invaded Indonesia (a period is known as the Japanese Interregnum). When the Japanese surrendered in 1945, Sukarno declared independence. However, the Dutch tried to reassert colonial control, but by this stage Indonesian nationalism had become too entrenched and, with shifting attitudes in Europe towards colonial empires, Indonesia was recognised as a nation-state in 1949.

⁴ Data retrieved from http://data.worldbank.org/country/indonesia

Indonesia's colonial past and fervently nationalist beginnings have both influenced its political system and public policy.

After the proclamation of independence in 1945, Indonesia faced several conflicts. A large number of tribal groups (involving the discontinuity factor of colonial rule as well as local sentiment) led to a regional rebellion from 1950 – 1965 (Tyson, 2010). When he came to power, Sukarno adopted a centralistic mode of government system to ensure national unity and defeated widespread regional rebellions.

Due to its demographic diversity, historically Indonesia has needed to address questions of national integration and ethnic separatism. According to Bunte (2008), ethnic-related complexities have led to excessive centralism in governmental administration systems, especially in the post-independence period. A way of understanding the political changes across the post-independence period, especially under Sukarno's 'Guided Democracy' (1957–65) and Suharto's New Order (1966–98) presidencies, is through an examination of the term *gotong-royong*, which is a Javanese term meaning mutual assistance. *Gotong-royong* can also mean a deliberative decision-making process but, in the end, senior members decide which the best option (Pye & Pye, 2009). Sukarno judged that the political party system was not in accordance with *gotong royong* principle (Bowen, 1986). *Gotong-royong* is a philosophical concept which influenced the national political system largely based on the respect afforded to "age and seniority" so that hierarchy and harmony are fundamental ingredients (Nomura, 2007, p. 499). Sukarno interpreted *gotong-royong* to emphasise harmony and conflict minimisation in order to emphasise unity at a time when he was politically isolated and under attack (Brown, 2003).

Under Sukarno, Indonesia faced a decline of export earnings and as a consequence the government carried out deficit financing which brought about a high inflation rate (Lamoureux, 2003). By the mid-1960s, the annual inflation rate was over 650% (Brown, 2003). The Sukarno regime 'collapsed' in mid-1965 due to "the rising conflict between the two political forces which - apart from Sukarno himself - had gained most from guided democracy: the communists and the military" (Brown, 2003, p. 197).

Sukarno's successor, Suharto, also used authoritarian controls (Sato, 2003). During the early years of his term, Suharto faced an immense workload to address the economic problems that had emerged particularly during the early 1960s. When he was first appointed to sit at the presidential office, 60% of the government's budget depended upon foreign loan (Lamoureux, 2003). After taking power in 1965–66, Suharto initiated a series of five yearly development plans called Repelita. In 1969, the first Repelita was announced with the primary intention to revive the nation's economy and to achieve self-sufficiency in rice production (Lamoureux, 2003).

Another strategy for economic development was to attract foreign investment. However, for this, the country needed to demonstrate political stability. The approach to achieve political stability across the diverse nation was excessive control of the regions primarily through centralism (Moeliono & Limberg, 2012). With time Suharto's regime became known as authoritarian and non-transparent, with poor legal and judicial sectors, political centralisation, limited civic participation, weak accountability, ineffective law enforcement, a substantial role of the military, low salaries of government officials including military, and rampant rent-seeking practices (McLeod, 2000; Sukma, 2003).

Of Suharto's term in his presidential office, Sukma (2003, p. 4) describes Suharto's 'New Order' approach as "an anathema to the principles of good governance". Indonesia's New Order consolidated its power several ways: through political parties, military and bureaucracy, judiciary, and state-owned enterprises (Bunte & Ufen, 2008; Erawan, 2007; R. McLeod, 2010). As economic stability and sustained good performance were the primary priority, democratic plurality was considered a threat to political stability (Carnegie, 2008). The New Order political elite pursued a "floating mass" policy that prohibited political parties from having branches at the lowest level of administration (villages which sit below the regency) in order to ensure that the villagers focussed on the economic development agenda (Anderson, 1990; Brown, 2003). As a consequence of political centralisation, the local government had a very limited role in developing programs for their areas.

Under the New Order, Indonesia experienced a remarkable macroeconomic gain with an average growth of 7% per annum. Between the mid-1960s and mid-1990s, the proportion of the population living in poverty fell from around 60% to 11% (Schwarz & Paris, 1999). However, the Asian financial crisis at the beginning of 1997 had a significant impact on the population in Indonesia, with the proportion of those living in poverty increasing. For example, in 1998 around 40 million people were living under the poverty level in contrast to 20 million recorded in the pre-financial crisis period (Schwarz & Paris, 1999). This deep economic crisis led to the departure of President Suharto in 1998. The post-Suharto political period became known as the Reform (Reformasi) era. There was strong pessimism among Indonesian observers immediately after Suharto's resignation about Indonesia's democratic prospects. Historical and structural barriers were the most cited reasons (see, for example, Mietzner, 2011). There were a number of legacies from the previous era that had been deep-rooted including, among others, corruption and the absence of good governance. In relation to corruption, after the demise of Suharto, the corruption became rampant as it was transferred to local levels (Nguitragool, 2012) where local elites came to political power after consolidating their positions through direct elections (Beard, Miraftab, & Silver, 2008). Numerous subsequent surveys that have focused on political corruption indicate that Indonesia has not been successful in eradicating corruption (Mietzner, 2015). Indeed, corruption has been observed at almost all levels of government administration from the top in Jakarta to the lowest of village territory (Butt, 2011).

In addition, Indonesia still has to confront numerous problems such as slow bureaucratic reforms and bad governance practices. It is widely acknowledged that Indonesia's bureaucratic performance is still far from ideal. The former Deputy Minister for Administrative and Bureaucratic Reform under President Yudhoyono said that some government employees are like "dead wood" due to their low level of competency (The Jakarta Post, 18 April 2013). Terms such as unresponsive, lacking motivation, sluggish, nontransparent, inefficient, underproductive, inadequately skilled, and graft-ridden, have been used to describe the quality of some members of the public service (Tjiptoherijanto, 2007).

Despite these assessments, Reform Era presidents have demonstrated a commitment towards democracy thus improving the quality of the judiciary and legislature, and improving governance within the bureaucracy (Ahern, Beard, Gueorguieva, & Sri Handini, 2012). With regard to democratic systems, there were a number of political transitions. For example, a series of constitutional amendments were introduced to enable people to choose the president and vice president directly. This marked a major shift from the previous approach where the choice of the president and vice president were decisions of the people's consultative assembly (MPR). Another notable democratic gain was a regional representative council (DPD) created in 2004 with the purpose of discussing bills related to regional matters. A judicial commission was also established to monitor the performance of judges, including those in the Supreme Court and Constitutional Court, ensuring that they conform to a code of ethics (Acharya, 2015).

Post Reformasi, under the Yudhoyono administration who took power in 2004, the government also initiated a bureaucratic reform aimed at improving the performance of the bureaucracy and to create good governance. Such reform covered four main elements: the balanced improvement of the work system, performance measurement, discipline implementation as well as a remuneration system. Yudhoyono's decade of rule was described as stable in political and economic activities but there was a lack of effective governance due to a coalitional cabinet that included many political parties in the government (Mietzner, 2016).

After two terms in power, President Susilo Bambang Yudhoyono (2004–2014) stepped down and was replaced by Joko Widodo - known most commonly as Jokowi. Jokowi was "the first Indonesian president not to have originated from traditional elite networks connected to the military, bureaucracy, or party machines" (Mietzner, 2015, p. 1). Jokowi's new government still has numerous challenges in addressing the legacy of Yudhoyono's government. These include a high level of corruption, persistently high poverty levels and a scarcity of jobs due, in particular, to the decline of manufacturing industries.

3.2.3 Decentralisation

Following the resignation of President Suharto in 1998, a number of groups and regions were dissatisfied with the highly centralised New Order administrative system. President Habibie's response was to develop a policy of decentralization that was followed by his predecessors. As an archipelagic country with a diverse ethnic and socio-economic background (Carnegie, 2008; Sutmuller & Setiono, 2011), commentators argued that decentralization was the best option for avoiding territorial separatism (OECD, 2012), and offering the opportunity for local governments to plan and budget their own development paths based on local needs (Tambunan, 2000).

Besides bringing positive improvement such as decreasing absolute poverty rates, equality in education and literacy, as well as health programs for prevention-related diseases (Miranti, Vidyattama, Hansnata, Cassells, & Duncan, 2013), decentralization in Indonesia did not solve many other issues. These include: the failure to increase community engagement and transparency (Ito, 2011), the persistence of dependence on high fiscal transfer from the central government (Siddiquee, Nastiti, & Sejati, 2012; Silver, 2003) and increased harmonisation problems for donors. Indeed, it can be concluded that under decentralisation two common problems are faced by local government: lack of capacity and unclear mandates.

During the decentralization period, the numbers of sub-national administrations increased significantly due to splintering, often along ethnic divisions. As noted by Firman (2013), between 1999 to 2010, seven new provinces were formed. There were 164 new districts (Kabupatens) and 34 new municipalities (Kota) making a total of 33 provinces, 386 districts and 91 municipalities (in 2010). This territorial splitting has been cited as an "unexpected outcome of the democratisation process" and a "spending machine" (Erb, 2011 from Schulte Nordholt and van Klinken (2007:17)).

The decentralisation policy has forced the central government to reposition its power. As explained earlier, through regional autonomy, the central government devolved both responsibilities and resources to municipalities-Kabupaten or rural districts and Kota or urban districts-rather than to provinces. Local government is responsible for delivering a wide range of services and public goods including health and education. The central government is responsible for matters related to foreign affairs, defence, justice, trade policy, monetary policy, fiscal balance, and religion. A consequence of this geographic devolution of authority was an increase in fiscal transfers from national to local government. These fiscal transfers were comprised of three elements: 1) a general purpose allocation fund (dana alokasi umum, DAU) aimed at equalizing fiscal capacity across districts and cities; 2) a special purpose allocation fund (dana alokasi khusus, DAK) that is, earmarked grants for natural disasters and other emergencies and for financing national government priorities at the local level, and 3) revenue sharing (shared tax revenues and natural resource revenues such as oil, gas, forestry and mining) (Blöndal et al., 2009). However, with limited capacity to generate their own income, local governments are highly dependent on these transfers from the national government, with such transfers accounting for around 90% of their income (Blöndal et al., 2009).

3.3 Part Two: Risks, Impacts and Policy

3.3.1 Physical Risks and Climate Change Impacts

Situated in the Pacific Ring of Fire, Indonesia has dozens of active volcanoes and frequent eruptions and earthquakes. Indonesia is listed among highly disaster-prone nations (Phillips, 2005). Salamanca et al. (2013) estimates that approximately 40% of the population lives in natural hazard-prone areas. It has been estimated that over the past 100 years natural disasters in Indonesia have resulted in more than 240,000 deaths and cost the country

approximately US\$30 billion (EM-DAT, 2016). With climate change models predicting that Indonesia will experience more climate-related natural disasters with greater intensity in coming decades, the Indonesian government has prioritised disaster management and climate change action as one of the determinants for national development (BAPPENAS, 2012; Djalante, 2012). This remainder of this section provides further details of the potential impacts of climate change for Indonesia.

As the largest archipelago in the world with approximately 81,000 km of coastline, Indonesia is among the countries that will suffer most from the climate change related sea level rise (BAPPENAS, 2010). By the year 2030, sea surface temperature is projected to increase by 0.65°C (BAPPENAS, 2010). This is predicted to have a significant direct and indirect impact on people living in some of Indonesia's largest cities including Jakarta and Surabaya as well as smaller coastal settlements (Garnaut, 2009). With more than 65% of the population of Indonesia's most populous island - Java Island - living along the coast, the impacts of sea level are projected to be particularly severe (MoE, 2007).

Recent studies show that sea levels in Indonesia have increased by 4 mm annually from 1993 to 2011 (Fenoglio-Marc et al., 2012). Another study has found that the sea level has been rising at a rate of, on average, 1.6 mm/year since 1960 and that since 1993, on average, this has increased to 7mm/year (BAPPENAS, 2014). There have also been recorded changes in long-term rainfall trends. For example, the analysis of precipitation data indicates that compared with the 1900s, there has been an increase in monthly rainfall in the 1970s with an increased value around 100mm in every 30 years (BAPPENAS, 2012). Considering rice farming is often near coastal areas (BAPPENAS, 2010), it is expected there will be "a loss of arable land through inundation and increased soil salinity, affecting crop growth and yield" (Förster et al., 2011, p. 894). One estimate suggests that the national production of rice will decrease from between 20.3% and 27.1% by 2050 from 2008 levels (BAPPENAS, 2010). Another study estimates that by 2050 the area of paddy rice fields could be reduced by 182,556 ha in Java and Bali, 78,701 ha in Sulawesi, 25,372 ha in Kalimantan, 3,170 ha in Sumatra, and 2,123 ha in Lombok (Suroso et al., 2009).

Given the coastal location of much of the population and industries, the impacts of climate change are forecast to include: decreasing food production, water shortages, environmental degradation, and human health problems (BAPPENAS, 2010). The high dependence on climate-sensitive sectors such as agriculture has created additional risk.

Around 15 million people in Indonesia rely on farming (Anggarendra, 2016). According to Leitmann (2009), climate change related economic losses could be equivalent to 2.5% of Indonesia's GDP by 2100 - or four times higher than the average projected global GDP loss. The Asian Development Bank (2009) considers that climate change could cost the Indonesian economy between 2.5% and 7% of its GDP by the end of the century.

3.3.2 Climate Change Policy Initiatives

Climate change policy in Indonesia cannot be separated from international initiatives to mitigate greenhouse gas emissions under the United Nations Framework Convention on Climate Change (UNFCCC) negotiation and the Kyoto protocol. To show its commitment to contribute to the global efforts in the reduction in CO2 emissions, the Indonesian government signed the UNFCCC in June 1992, and it was ratified in August 1994. In addition, Indonesia became a signatory to the Kyoto Protocol in July 1998 and ratified this in December 2004. The major climate change policies in Indonesia are presented in Table 2.

Date	Events
June 1992	Signature of the UNFCCC
August 1994	Ratification of the UNFCCC
October 1999	Submission of the First National Communications
July 1998	Signature of Kyoto Protocol
December 2004	Ratification of Kyoto Protocol
November 2007	National Action Plan for Climate Change (RAN-PI)
December 2007	National Development Planning: Indonesia Responses to Climate Change
December 2007	UNFCCC COP13 in Bali
July 2008	Establishment of DNPI
September 2009	Establishment of Indonesia Climate Change Trust Fund (ICCTF)
September 2009	Announcement of 26 % emission reduction target at G20 meeting in Pittsburgh
December 2009	Indonesia Climate Change Sectoral Roadmap
December 2009	Announcement of 26 % reduction target at UNFCCC/COP15 in Copenhagen
January 2010	Submission of Indonesia NAMAs to the UNFCCC
March 2010	Revision of National Development Planning: Indonesia Responses to Climate
	Change (Yellow Book)
November 2010	Submission of the Second National Communications
September 2011	Presidential Regulation No. 61/Year 2011 concerning RAN-GRK (Emission
	reduction)
October 2011	Presidential Regulation No. 71/Year 2011 concerning GHG Inventory
February 2014	National Action Plan for Climate Change Adaptation (RAN API)

Table 2: Chronology of Policy Response	ponse to Climate Change in Indonesia
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Indonesia has written a number of documents addressing climate change (see Table 3) including the National Action Plan of Climate Change Mitigation and Adaptation (NAP-CCMA) in 2007 by the Ministry of Environment (MOE); Indonesian Climate Change

Sectoral Roadmap (ICCSR) by BAPPENAS (National Development Planning Agency) in 2010, and Indonesian Climate Change Adaptation Strategy by DNPI (National Council for Climate Change). In relation to these national climate change policy initiatives, the documents mostly identified the risks of climate change and the need for more adaptation-related activities without establishing appropriate methods or guidelines how to undertake these activities. The Indonesian government has also been criticised for developing too many initiatives that often overlap and lacking a clear analysis of their effectiveness (Salamanca et al., 2013).

Document	Publisher	Year	Objective
National Action Plan of	Ministry of Environment	2007	Provides principles covering immediate
Climate Change	(MOE)		(2007–2009), short-term (2009–2012),
Mitigation and			medium-term (2012-2015) and long-
Adaptation (NAP-			term (2025–2050) time frames for both
CCMA)			mitigation and adaptation.
National Development	BAPPENAS (National	2008	Serves as a bridge document between
Planning: Indonesia's	Development Planning		the National Mid-term Development
Responses to Climate	Agency)		Plan (RPJM 2004–2009) and the next
Change			RPJM (2010–2014).
Second National	Ministry of Environment	2010	States the latest national circumstances,
Communication to	(MOE)		GHG inventory, needs and policies both
UNFCCC			for Mitigation and Adaptation policies
			till CY2020.
Indonesia Climate	BAPPENAS (National	2010	Sets priority issues and key policy
Change Sectoral	Development Planning		actions in four 5-year periods till
Roadmap (ICCSR)	Agency)		CY2030.
Indonesia Climate	by DNPI (National	2011	Provides information on five urgent
Change Adaptation	Council for Climate		adaptation priority programmes related
Strategy	Change)		to agriculture, coastal areas, health, and
			public works
National Action Plan for	BAPPENAS (National	2012	Provides directions for mainstreaming
Climate Change	Development Planning		climate change adaptation into national,
Adaptation (RAN API)	Agency)		local, and sectoral development
			planning.

Table 3: Major Policy Initiatives related to Climate Change

Indonesia is considered to be a major contributor to global warming because of its contribution to GHG emissions. Indonesia is ranked as the third largest emitter of greenhouse gasses after China and USA. Emissions primarily came from land use changes caused by rapid deforestation during the 1990s (Hunt, 2010; Jotzo, 2012). As part of its commitment to the COP 15 agreement in Copenhagen in 2009, Indonesia committed to reducing greenhouse gas emissions by 26% by 2020 (while this number can be increased to 41% with international support) (Indrarto et al., 2012). Numerous donors have also promised to provide financial assistance. For example, the assignment of a Letter of Intent between Norway and Indonesia

in which Norway committed to pledging up to US\$1 billion (Hunt, 2010; Luttrell, Resosudarmo, Muharrom, Brockhaus, & Seymour, 2012). Given that the bulk of Indonesia's emission comes from land-based activities, the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism has been seen as the most appropriate mitigation option (Luttrell et al., 2012).

In the area of mitigation, both national and regional action plans on emission reduction have been launched. The legal basis for RAN GRK (National Action Plan on GHG Emission Reduction) was Presidential Regulation no. 61/2011 and Presidential Regulation no. 71/2011 on the GHG inventory.

With regard to adaptation, the Indonesian government initiated the national adaptation strategy (known by RAN API) in 2012 and it was officially been launched in February 2014. This document was prepared jointly by BAPPENAS and development partners such as ADB, JICA, and GIZ. This document is a roadmap for Indonesia to achieve a more resilient society through increased coordination and greater synergy of different sectors and jurisdictional authorities through the setting of national targets.

RAN API serves as an umbrella for sectoral adaptation strategies through developing policy documents or implementing programs on the ground. For instance, the Ministry of Public Works developed RAN-MAPI (National Action Plan - Mitigation Adaptation to Climate Change) and the Vulnerability Analysis, Map of Vulnerability and the Impact of Climate Change on Indonesia conducted by the Ministry of Environment, and a health adaptation program initiated by the Ministry of Health (BAPPENAS, 2012). At its core, RAN API presents a climate impact scenario and guidelines for stakeholders to manage adaptation activities in four main areas: economic (food and energy); social and livelihoods; ecosystems; and special areas (urban and coastal). RAN API provides a checklist of numerous issues that helps to promote adaptive capacity in each sector. This recognises the important role of major agents such as donors, private sectors, advocacy groups, research entities, and local government.

This policy document aimed at providing: 1) direction for the mainstreaming of issues on climate change adaptation into the national development planning process; 2) direction for sectoral and cross-sectoral adaptation actions that are more integrated in the short-term (2013-2014), medium-term (2015-2019) and long-term (2020-2025); 3) direction for priority adaptation actions in the short-term that underpin applications for international funding; and

4) direction for sectors and regions in developing adaptation actions that are in synergy and that endeavour to develop a more effective communication and coordination system (BAPPENAS, 2012).

RAN API was a formal response to the potential impacts of climate change. The document emphasised the need for adaptation as the threat of climate change would be significant in terms of economic and environmental loss (BAPPENAS, 2012). This document did not have a formal legal basis but served as the main input in policymaking through the government's annual plan and the national medium-term development plan. For local government, the document acted as a major component in designing adaptation programs. As there was no explicit obligation for local municipalities, mainstreaming of adaptation was treated as a voluntary task and was generally poorly understood. In this context, coordination has been among the major constraints in the REDD+ program (Mulyani & Jepson, 2013), disaster management (Djalante, 2012), and also seems likely to be a barrier for adaptation (BAPPENAS, 2014). Moreover, if implementation disregards the local context, it would potentially be unsuccessful (Larson & Ribot, 2009).

In relation to mainstreaming adaptation into the existing development process, coordination between the central government and its local counterpart is important (BAPPENAS, 2012). Furthermore, while inter-jurisdictional coordination between central, provincial, and local authorities in important, effective implementation of strategies at the local level is seen as critical. This is because local authorities have close ties with their communities – who are ultimately the ones that need to adapt their behaviours and or livelihoods.

3.3.3 Institutional Responses to Climate Change

In order to demonstrate the state commitment to tackling climate change, there were two major institutions established: the National Council for Climate Change (NCCC) and the Indonesian Climate Change Trust Fund (ICCTF). The establishment of NCCC cannot be separated from the emerging issues of climate change. This inter-agency network has a specific mandate for coordination and facilitation of the climate change program focused on both mitigation and adaptation implemented by the government, private sectors, NGOs as well as communities in general. NCCC is the national focal point of the United Nations Framework Convention on Climate Change. The main objective of this body was to serve as the primary institution for policy coordination on climate change. According to Presidential Decree No. 46/2008 (Article 3), the key mandates of the NCCC are to formulate national climate change control policies, strategies, programmes, and activities. A further mandate is to coordinate the implementation of climate change control activities which comprise adaptation, mitigation, technology transfer and funding. NCCC was also mandated as the Designated National Authority (DNA) under the Clean Development Mechanism (CDM). The council was chaired by the President and Coordinating Ministers for Economic Affairs and for People's Welfare serving as vice-chairs. Council members comprised 16 cabinet ministers and the Head of Meteorology, Climatology and Geophysics.

Indonesian Climate Change Trust Fund (ICCTF) is a financial institution established in 2009. This institution was established to address the lack of coordination and the small amount of financial assistance from donors. The existence of one national institution dedicated to collecting and managing all sources of international assistance was needed to ensure finance for large climate-related projects (GIZ, 2012). The aim of the ICCTF is "to contribute effectively and efficiently to mainstreaming climate change issues in government planning and the implementation of climate change activities across Indonesia" (ICCTF Website). There were three priority projects financed by ICCTF: land-based mitigation, energy, and adaptation and resilience for Indonesia's climate change policy actions. Initially, from 2010 to 2014, the Department for International Development (DFID-UK) and AUSAID (Australia) were the main funding providers who allocated US\$7.5 million and US\$2 million respectively (GIZ, 2012). UNDP was chosen as an interim fund manager.

In short, Indonesia's climate policy has largely focussed on mitigation (reducing emissions) rather than mainstreaming adaptation. The adaptation agenda gained momentum after the UNFCCC COP 13 meeting in Bali in 2007 which emphasised the importance of integrating adaptation into environmental planning. The increasing attention to adaptation is also due to the awareness of multilateral and bilateral agencies and donor countries seeking to mainstream adaptation into their development assistance, including Indonesia. With the national government focused on mitigation efforts, adaptation did not receive meaningful attention until 2014 when the government officially released the RAN API.

3.4 Conclusion

This chapter has presented an overview of the historical and socio-political context in Indonesia as it relates to the development of climate change policy and responses. Looking back over the last several decades, Indonesia has experienced significant changes from centralised, single form of decision-making practices to more open and democratic ones. The transformation from authoritarian rule required a strong commitment to end the embedded culture of corruption and government ineffectiveness. Numerous efforts to address this challenge remain sub-optimal. The common barriers are resistance within governmental bodies themselves. Moreover, coordination among different sectors and levels in the context of decentralisation seems to be the major constraint in achieving a more coherent policy adaptation mainstreaming of into development setting for the policy.

Chapter Four: Research Methodology

4.1 Introduction

This chapter provides a detailed account of the research design and methods used in this thesis as well as a scholarly justification for the study's research procedures and methods of data analysis. The chapter begins with an explanation of the nature of this study and the qualitative approach taken before describing the data collection and analysis techniques. It is structured into five sections: research design, case study, data collection, data analysis, and conclusion.

4.2 Research Design

Identifying a research paradigm, along with topic selection, is the first step in scientific research (Miller & Yang, 2007; Schensul, Schensul, & LeCompte, 2013). A research paradigm is defined as "a set of beliefs and practices associated with a particular style of research" and can be categorised into two broad approaches: 'quantitative research' and 'qualitative research' (Denscombe, 2014, p. 326). Importantly, research can draw on both quantitative and qualitative traditions and techniques (Creswell, 2013). Broadly, a qualitative research design is most suitable for research questions on 'why' and 'how' while quantitative research suits the questions of 'what', 'where', 'when', and 'how many' (Liamputtong, 2009; Vanderstoep & Johnston, 2009). The research approach chosen, according to Bryman (2003), must be suited to the research questions that will be examined. Within the qualitative research tradition, attention is focused on an exploration of new phenomena and an examination of thoughts, feelings, or interpretations of meaning and process of people in their own position (reality) and environment (Given, 2008; Liamputtong, 2009).

Given the nature of the issue being examined in this thesis; that is, analysing and interpreting multiple aspects of people's behaviour, a qualitative method is an appropriate approach (Kothari, 2004; Liamputtong, 2009). Maddison and Denniss (2013, p. 228) argued that qualitative research is particularly important if policy researchers desire to "gain a deeper understanding of the issues associated with a policy problem at the outset of a larger research project" and "to shed light on the results of quantitative research that require a deeper understanding". Also, given the topic of inquiry, an exploratory approach was used as it

facilitated the investigation of a relatively new topic (Babbie, 2013) about adaptation to climate impact problems. An exploratory qualitative approach was particularly useful to uncover individual perspectives about adaptation to climate impact problems that are normally not apparent in the formal reports or government documents.

This thesis drew on both inductive (theory-driven discovery of information) and a deductive (practice-driven testing of theory) research traditions in developing its conceptual framework. The conceptual framework of mainstreaming follows a deductive logic. In the words of Schensul et al. (2013, p. 5) "no ethnographer enters the field setting without at least some ideas, theories, hunches, and hypotheses and a research question of some sort". However, this thesis also aims to identify general themes and patterns and expand or refine the conceptual framework through the empirical research and, as such, draws on an inductive process (Bowen, 2009; Given, 2008).

The study was developed in accordance with the *Australian National Statement on Ethical Conduct in Human Research, 2007.* The study was approved by the Curtin University Human Research Ethics Committee.

4.3 Case Studies

Case studies are useful for enabling researchers to elaborate, refine and 'ground truth' understandings developed from the literature or other secondary data. The case study is a suitable method for analysing "an issue in depth and provide an explanation that can cope with the complexity and subtlety of real life situations" (Denscombe, 2014, p. 55). As further elaborated by Abdulai and Owusu-Ansah (2014, p. 10), the case study is "an in-depth systematic investigation of a phenomenon (which can be a program, an event, an activity, a process, a geographical location, one or more individuals, etc.) by a researcher". Empirical evidence from the case study is important to show how adaptation occurs on the ground.

This thesis centred on Indonesia and, within that, drew on four case studies. Empirical data were collected during an intensive 12-month period of fieldwork in Indonesia. The researcher conducted data collection in Jakarta during which national level processes and responses was the focus. Field work was also conducted in four district governments (two cities and two regencies) to understand community responses to climate hazards. Fieldwork was also conducted in a village to capture 'grass-root level' responses in disaster-prone areas. This multi-scale case study approach was critical in enabling the researcher to develop a

comprehensive understanding of the processes impacting policy development and implementation.

Crate (2011, p. 1) argued that in examining the relationship between humans and the environment researchers should "adopt cross-scale, multi-stakeholders, and interdisciplinary approaches in research and practice". Given the recognition that climate change adaptation and mitigation has a horizontal component (across sectors and different groups of stakeholders) and a vertical component (across multiple governance levels – local, national, regional and global) (Karlsson, 2007; Mickwitz et al., 2009), a multi-sited study was regarded as appropriate to understand the complexity of adaptation initiatives, and the interactions among adaptation players at different levels, to uncover details about how climate adaptation and climate risk management were made. Indeed, Neyland (2007, p. 69) argued:

This entails moving from place to place and studying the ways in which policy is understood differently in each place. What might appear to be a single policy is the focal point for very different forms of social organization in each site. Hence the ethnography is not just about moving from one place to another but investigating the ways in which policies move and change and form a central discussion point for different local forms of organizing.

Crate (2011, p. 175) has termed this cross-scale, multi-stakeholder, and interdisciplinary approaches in investigating climate change "climate ethnography".

In developing countries, the national authority, together with international actors, typically have the responsibility of facilitating adaptation in lower-tier governmental organisations. However, local governments are typically the most active in implementing adaptation policy and actions given that the direct impact of climate change is likely to occur at this level (see Figure 3). In recognition of this, this thesis includes a focus on the grass-roots level where adaptation measures are implemented. Hence, a multi-sited approach was adopted to explore how adaptation policies were formulated and practiced.

Figure 3: Cross Scale and Multi Stakeholder Diagram



The local case studies were conducted at ward level in three *Kelurahan* (the lowest level of governmental structure) within Semarang city. The sites for the case studies were selected based on initial interviews with government officers at the district level and NGO staff. Each location was selected as it provided examples of grassroots-level adaptation initiatives operating in practice and, therefore, enabled the researcher to analyse the contributing factors to the mainstreaming of adaptation approaches into development policy. The three locations were considered by the initial interview participants as representative of many others in hazard-prone areas in Indonesia.

As noted above, preliminary interviews were conducted with local NGO staff in Semarang. These provided useful data about local adaptation measures at a grassroots level and helped the researcher identify knowledgeable informants from governmental organisations. During the fieldwork, a former NGO staffer helped the researcher by facilitating introductions to the key informants. The NGO staffer had good relationships with the local leaders and local people.

4.4 Data Collection

Data were collected for this thesis through document analysis, participant observation, and interviews. As Hyett, Kenny, and Dickson-Swift (2014) noted, these triangulation techniques can enable the researcher to develop a more holistic understanding of complex processes or situations. For this thesis, the three data collecting techniques were used to facilitate deeper insight into the relationship between the local, national, and global process of adaptation from different perspectives.

4.4.1 Document Analysis

Document analysis was used to identify background or qualifying evidence to support the interviews. Document analysis is regarded as an unobtrusive method for "studying human behaviour that does not rely on asking people directly (such as interviewing) or observing people (such as doing participation observation)" (Esterberg, 2002, p. 115). One of the purposes of this unobtrusive method is "tracking change and development" (Bowen, 2009, p. 30). This form of materials can also be used as the source of information regarding the historical events (Babbie, 2013; Bryman, 2015; Corbetta, 2003); in this case, the past experience of climate-related disasters and the recorded estimation of the cost and damage. Examining documents also helps in developing research instruments (the interview guide) and the choice of sites for the next stage of the data collection process (Bowen, 2009).

Documents were sourced from the national library of Indonesia, bookshops, official websites and online news media. Historical data about climate change and policy were collected from various publications including reports, newsletters, and policy documents (Esterberg, 2002; Patton, 1990). Online resources, magazine and newspaper articles also served as a source of basic information and provided a general picture of climate change issues in the public sphere. Documents for analysis were collected primarily from governmental organisations including the National Development Planning Agency (Bappenas), the Ministry of Environment, the National Climate Change Council, and the Indonesian Research Institute. The government documents, primarily related to climate change adaptation, included the:

• National Action Plan for Climate Change Adaptation (RAN-API) by National Development Planning Agency

• National Action Plan of Climate Change Mitigation and Adaptation (NAP-CCMA) by Ministry of Environment (MOE)

Indonesia Climate Change Sectoral Roadmap (ICCSR) by National
Development Planning Agency

• Indonesia Climate Change Adaptation Strategy by National Council for Climate Change.

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Reports, newsletters, project documents, and documentation published by local governments, NGOs and development partners were also collected and used in the document analysis.

The documents enabled the researcher to develop a comprehensive understanding of the development of mainstreaming adaptation into existing development planning, the recorded barriers encountered by adaptation players, as well as public and government perspectives on climate change. The information collected through the document analysis informed the interview instrument and provided a framework for the analysis of the data collected through both the interviews and participant observation.

4.4.2 Participant Observation

Participant observation was used to collect information about adaptation meetings and practices at the central, provincial, district and community level. Participant observation is an established research technique most commonly associated with ethnography (Bryman, 2003).

During the field work, the researcher spent three months in Jakarta as an observer in the Centre for Climate Change Financing and Multilateral Cooperation, Ministry of Finance, in the role of the government officer. My involvement with the Centre for Climate Change Financing and Multilateral Cooperation began in 2011 when the Centre was established. This experience provided the researcher with access to research and policy discussions about mainstreaming adaptation from inside the organisation (Bryman, 2015).

While at the Centre for Climate Change Financing and Multilateral Cooperation, the researcher was able to observe the organisation's daily activities as he was immersed in the daily activities of the organisation. The researcher engaged in numerous interactions with government officers, NGO representatives, academics, development partners and disaster risk management practitioners through which first-hand accounts about policy development, implementation and assessment were obtained.

Through the researcher's work at the Centre for Climate Change Financing and Multilateral Cooperation, access to focus group discussions, seminars and meetings related to adaptation programs was gained. For example, the researcher was involved in a seminar on the convergence of disaster risk reduction and climate adaptation sponsored by UNDP in Bandung West Java (18-19 December 2014), strategic planning and action to strengthen climate change resilience of rural communities held by Ministry of Environment in Kupang, East Nusa Tenggara (23-24 July 2014), a seminar on Response Farming to Climate Change at Centre for Anthropological Studies, University of Indonesia (26 May 2014), Adaptation Working Group Meeting for the Third National Communication (TNC) (30 April 2014) held by Ministry of Environment in Bogor, West Java, and several Focus Group Discussions about the climate change issue (mainly mitigation) sponsored by donors or international organisations such as OECD and UNDP.

While embedded in the Centre for Climate Change Financing and Multilateral Cooperation, the researcher conducted informal interviews with different participants including government officials, NGO representatives, academics, consultants, development partner staff, and representatives from local governments.

4.4.3 Interviews

Participant observation as a research method is typically paired with structured or semi-structured interviews (Bryman, 2015). Semi-structured interviews were conducted with key informants who were engaged in climate change programmes. Potential participants were selected according to their professional mandate, expertise or those who had specific experience with adaptation issues. Informants were selected from the researcher's own professional networks and the recommendations from other participants (purposive snowball sampling). This thesis, therefore, targeted relevant government officials; mainly those relating to climate adaptation planning and policymaking processes. This meant that interviewees were selected purposively based on their participation in climate change adaptation activities and represented a wide spectrum of organisations.

Obtaining an authorisation letter is an important pre-requisite for conducting fieldwork in Indonesia. The head of the Centre for Climate Change Financing and Multilateral Cooperation provided the researcher with a letter asking participants if they were would like to take part in this research. Initial requests for interviews were made through email. This method enabled the researcher to rapidly identify the eligible and available participants (Jupp, 2006); the letter of authorisation appeared to increase participants' perceptions of the credibility of the study and thereby willingness to participate (Denscombe, 2014). The list of the interview participants is in Table 4.

Table 4: List of Interviewees

No	Level	Organisations	Number of Respondents
1	International	GIZ JICA OECD UNDP	3 1 1 2
2	National	Ministry of Environment Ministry of Finance RAN API Secretariat Bappenas National Council for Climate Change Agency For The Assessment And Application of Technology	2 5 2 1 1
3	Provincial	Bappeda Central Java Province	1
4	Local/Municipals	Bappeda Semarang City Environmental Protection Agency Semarang Local Body for Disaster Management, Semarang Environmental Protection Agency Pekalongan Bappeda Pekalongan Environmental Protection Agency Temanggung Bappeda Temanggung Environmental Protection Agency Tegal Regency	1 1 3 1 1 1 1
5	Community	Kelurahan Official Local Leader Elderly Informant Community Activist Informant	4 3 1 5 5
6	Academics	University of Indonesia, Jakarta Bandung Institute of Technology, Bandung Bogor Agriculture Institute, Bogor Diponegoro University, Semarang	1 1 1 3
7	NGOs	MercyCorps Bintari Associations of City Governments Indonesian Society for Disaster Management (MPBI)	2 3 2 1

Both unstructured and semi-structured interviews were conducted to elicit information from key informants involved in adaptation. All interviews were conducted face-to-face. The choice to use face-to-face interviews was to enable rapport and trust between the interviewer and interviewees (Bryman, 2015). Interviews that took place in participants' offices typically ranged in duration from 30 minutes to 2 hours depending on the participants' willingness to continue the interview. During the interviews, the researcher also sought copies of relevant documents from participants.

Interviews were mainly conducted in Bahasa, the official language of Indonesia. The exception was for representatives of development partners; these interviews were conducted in English as per the participants' preference.

All interviews were digitally recorded. The interview session normally started with participants being provided with a short description of the aims of this study and the type of information being sought through the interviews. This was particularly important in order to provide participants with a clear understanding of the purpose of the interview.

The interviews were structured around eliciting basic information regarding adaptation issues and respondents' opinions about adaptation policies. Participants were asked about their perception of climate change impacts, how governments should support adaptation to climate change and what barriers they faced. Semi-structured interviews were conducted to enable in-depth, open-ended conversation and to allow participants to suggest or elaborate on topics (Campbell & Lassiter, 2014; Given, 2008). This enabled respondents to express their opinions and attitudes to achieve a more complete understanding (Kothari, 2004). As some of the data collected were confidential, participants were advised prior to commencing the interview that their identity would be kept confidential where possible.

Questions for national level informants	Basic questions about adaptation and mainstreaming		
	it into development planning		
	Motivating factors for mainstreaming		
	Opportunities and obstacles for mainstreaming		
	The institutional mechanisms to steer integration		
Questions for local level informants	Basic questions about adaptation and mainstreaming it into local development planning The link between decentralisation and mainstreaming Responses to climate hazards Trade-off between the immediate interests and long- term adaptation programs		
Questions for individuals in	Impacts of climate events in the community		
Communities	The awareness and understanding of climate change issues		
	Responses to climate related hazards		
	The capacity of residents to cope with the hazards		
	The role of social capital		

Table 5: Summary of Interview Questions

4.5 Data Analysis

As Esterberg (2002) stressed, the approach to data analysis is central to enabling a researcher to uncover the meaning within data; that is, to link the collected data "with higher order concepts" (Given, 2008, p. 186). For studies that use "talk and text" (interviews and document analysis) as the major data collection tools, Denscombe (2014) suggested that the data should be analysed using a line-by-line reading of the documents and interview transcripts to enable the researcher to identify ideas and concepts (Given, 2008) as well as to identify clusters or categories (Strauss & Corbin, 1998). To enable this, a coding system is critical to enable the researcher to identify, sort, and group ideas and concepts (Schensul et al., 2013; Silver & Lewins, 2014). Coding is "naming segments of data with a label that simultaneously categorizes, summarizes, and accounts for each piece of data" (Charmaz, 2014, p. 43). This is the process to convert transcripts and documents into "a more organised format that is easier for the researcher to inspect and understand" (Payne & Payne, 2004, p. 36).

In this thesis, data collection, coding, and analysis was undertaken simultaneously (Denscombe, 2014; Payne & Payne, 2004). The coding process was based on the theoretical framework and key themes identified in the literature review. This iterative process enabled the researcher to utilise an "identification-verification cycle" (Miller & Yang, 2007, p. 158). To help organise, sort and search the data a computer-assisted qualitative data analysis software package NVivo was used.

As suggested by Flick (2013), the coding procedures consisted of two phases: initial and focused coding (note: in NVivo these are called free nodes and tree nodes respectively). Initial coding (or open coding) is concerned with labelling sections of data (Denscombe, 2014) while focused (axial) coding is a means of exploring the relationship between the codes generated by open coding where "similar codes may be grouped together, merged into higher-level categories, or subdivided into more detailed ones" (Silver & Lewins, 2014, p. 84). Table 6 provides examples of coding generated for this study.

Axial or coding	Initial or open coding
Mainstreaming	development planning, cost-effective, implementation, sectoral decision-making/stand alone, incremental, policy coherence
Adaptation	migration, living with water, rain water harvesting, no regret
Drivers	extreme weather, risk awareness, political pressure, scientific research, pressure from NGOs & donors, the experience of implementation, the economic cost of inaction, international efforts
Barriers	wicked, siloism, passive, complexity, uncertainty, long-term vs short-term, information funding capacity, policy gap, administrative, political will, leadership, institutional memory,
Networking	fragmented, coordination, bridging social capital, city team, communication,
Multi-Stakeholder/ Multi-level Governance	academics, government institutions, NGOs, donors, consultant, an association of local government
Facilitating Factors	compatibility with other policies, political will, suitable timing, active people taking lead, international/progress in other countries
Social Capital	public participation, private sector assistance, social support, coping network, state-civil society relationship, social mobilisation, local leadership, awareness, religion
Vulnerability/Resilience	density, topography, poverty, low income, educational attainment, religion, vulnerability assessment
Hazard	land subsidence, floods & drought, sea level rise, trend & projection, early warning, precipitation

Table 6: Examples of Coding Classification

4.6 Limitations of the study

A limitation of this thesis was that it focused on municipalities in Java Island and did not address other regions, for example outside Java Island, which could perhaps enrich the findings of this thesis. While this approach enabled the researcher to gather critical and complex data about the development and implementation of policy at different scales, it is possible that in other regions or localities in Indonesia there have been different experiences that have not been captured through this study.

A second limitation to this thesis was the continue changes in the national and local political situation impact to environment-related policies over the period of fieldwork and the writing of this thesis. For example, the new president Jokowi merged two separate ministries namely Ministry of Environment and Ministry of Forestry into one called Ministry of Environment and Forestry. In addition, President also signed Presidential Regulation in which REDD+ Task Force and the National Committee on Climate Change (DNPI) were integrated into the Ministry of Environment and Forestry.

Third, the researcher was employed as a government official within the Centre for Climate Change Financing and Multilateral Cooperation, Ministry of Finance. While this position certainly enabled the researcher access to people and documents that normally would be difficult to access, it is possible that the researcher's position dissuaded some potential interview participants from participating in this study.

4.7 Conclusion

The research design described above enabled the researcher to elicit evidence about the mainstreaming of adaptation to climate change within development policy from a diverse group of individuals. The qualitative methodology proved suitable given the nature of the research questions. To ensure the researcher could develop a robust knowledge about the practices and processes impacting climate change policy mainstreaming, several data collection methods were used. These included document analysis, interviews, and participant observation. Since global climate change issues are inherently complex and multidirectional (Mickwitz et al., 2009), and where it has a horizontal component (across sectors and different groups of stakeholders) and a vertical component (across multiple governance levels – local, national, regional and global) (Karlsson, 2007), a multi-sited approach was adopted to explore how adaptation policies were formulated and practiced.

Chapter Five: Applying Stakeholder Analysis: Case Study of Mainstreaming Adaptation in Indonesia

5.1 Introduction

As discussed in Chapter Two, the involvement of a wide range of adaptation-related players is the main feature of modern adaptive governance (Bauer et al., 2012; Burns & Stöhr, 2011; Hulme et al., 2009). This kind of strategy has become popular for dealing with environmental issues (Cloutier et al., 2014) because it can lessen potential conflicts in the implementation phase and also take into account that innovation and new methods might emerge from involving diverse stakeholders (Anguelovski et al., 2014; Bauer et al., 2012; Bryson, 2004). Such an approach has also been linked to an increase in the durability, stability, legitimacy, and replicability of the policy (Chu, Anguelovski, & Carmin, 2015; Kehew et al., 2013; Sherman & Ford, 2014). However, it should be noted that the involvement of diverse stakeholders can bring negative impacts such as inefficiency in resource utilisation, diverse opinions that can be difficult to effectively manage, and potentially a postponement of action (Termeer et al., 2013; Pahl-Wostl, 2009).

The aim of this chapter is to analyse Indonesia's current institutional arrangements designed to address climate change issues at the national level. To achieve this, the chapter answers the following key research questions: how is Indonesia's central government designing its National Adaptation Strategy, and what are the fundamental challenges and the existing of organisational structures that constrain mainstream climate change adaptation over a wide array of sectors?

In addressing these questions, both Multi-Stakeholder Influence Mapping (MSIM) (Sova et al., 2014) and the Interest-Influence Matrices framework (IIM) are used (Ackermann & Eden, 2011; Reed et al., 2009). Through mapping, the power relationships amongst stakeholders, the relationship between poor climate governance, the lack of clear signals in the adaptation agenda, and the slow progress of adaptation uptake at the municipality level is outlined.

There are five sections in this chapter starting with the introduction. The second section reviews why stakeholder analyses matter for mainstreaming and the toolkit used to identify stakeholders and their capacities to influence others despite different interests and objectives. The third section presents data about the processes for formulating mainstreaming

adaptation into the national development planning agenda in Indonesia. The aims of this section are to provide information on existing institutional capacity at the national level and, in particular, to identify the roles and relationships among the major government agencies, and which stakeholders are involved. The fourth section focuses on the Multi-Stakeholder Influence Mapping (MSIM) and Interest-Influence Matrices (IIM) frameworks to analyse the power relationships during the drafting of national adaptation strategies. Some conclusions and recommendations are drawn in the final section.

5.2 Mainstreaming the Adaptation Policy and Key Stakeholders Analysis

There are various views what 'stakeholder' means and how it links to the decisionmaking process (Bryson, 2004; Reed et al., 2009). As the inherent characteristic of climate governance is the existence of deep fragmentation in terms of actors and institutions (Termeer et al., 2011), scholars have suggested working closely with diverse players, sectors, and jurisdictions to achieve the best outcome.

The purpose of shedding light on existing stakeholder capacities is to identify the roles and relationships among the major government agencies. Based on this information which agency has the mandate to mainstream adaptation can be assessed (Gelil, 2014). Understanding some basic information about the national governance system and decision-making processes, as well as international agreements signed by government, might help to analyse and formulate the most effective steps for mainstreaming adaptation (SPREP & UNDP, 2013). The presence of government institutions at a national level who work effectively is the core reason for increasing adaptive capacity in a nation (Dixit, McGray, Gonzales, & Desmond, 2012). Among other things, any activities intended to increase adaptive capacity to deal with uncertain future climatic threats either in the shape of development planning, policy recommendations, or funding provisions, will be determined by power dynamics among engaged competing actors (Sova et al., 2014). Accordingly, an understanding of these political dynamics will facilitate better policy formulation and is central to the analysis of climate change policy.

A useful tool to examine which stakeholders are and are not engaged in formulating adaptation strategies is through a stakeholder analysis. This approach, therefore, can be used as a starting point to help visualise the relationship among stakeholders and understand which government agencies are most suitable to engage in the process of mainstreaming adaptation in Indonesia. In this chapter, a stakeholder is described as "any person or organisation affected by, or with the capacity to influence, the issue at hand" (Benham, Hussey, & Beavis, 2014, p. 2). Beyond social psychological scholarly works, what is meant by the term "influence" is rare (Reed et al., 2009). For the purpose of this thesis, influence is defined as the "process of affecting the thoughts, behaviour, and feelings of another" (Nelson & Quick, 1994 cited in Reed et al., 2009, p. 1942). Reed et al (2009) further argue that the capacity to influence policy processes across multiple organisations is dependent on the balance of power between different stakeholders.

Following Grimble and Wellard (1997, p. 175), stakeholder analysis refers to "a holistic approach or procedure for gaining an understanding of a system, and assessing the impact of changes to that system, by means of identifying the key actors or stakeholders and assessing their respective interests in the system". This process ensures that no key player is missing during consultation forums. Thus, all key players should be actively involved in each step of the mainstreaming process (Gelil, 2014) in order to identify the most appropriate forms of adaptation (Masters & Duff, 2011). The broad groups that will be important to work with are: parliament, policymaking agencies operating across sectors at different levels, scientific and educational research institutions; particularly those with interdisciplinary programs, private sector organizations; particularly those involved in the climate proofing infrastructure development and services, civil society and community-based organizations, and international organizations (Anbumozhi et al., 2012).

In this stakeholder analysis, some questions need to be addressed including: (i) who are the key actors/focal points for adaptation in Indonesia? (ii) what government institution has the responsibility for mainstreaming adaptation? (iii) which ministries need to be involved in the mainstreaming? (iv) how important is setting up a new institution in the context of mainstreaming?

5.3 Theoretical Framework: Multi-Stakeholder Influence Mapping (MSIM) and Interest-Influence Matrix (IIM)

In order to have a clear picture about the dynamics of the policy-making process during the design of *Rencana Aksi Nasional Adaptasi Perubahan Iklim* (National Adaptation Strategies), it is essential to understand the role of key actors and identify which agencies have more power to influence other players. As discussed in Chapter Three, RAN-API is a national adaptation plan document aimed at providing directions how adaptation is addressed in the development plans. In designing RAN API, the engagement of stakeholders was limited to only a few agencies. They were the National Development Planning Agency (Badan Perencanaan Pembangunan Nasional, BAPPENAS), the Ministry of Environment (Kementerian Lingkungan Hidup, KLH), the Agency for Meteorology, Climatology and Geophysics (Badan Meteorologi, Klimatologi, dan Geofisika, BMKG) and the National Council on Climate Change (Dewan Nasional Perubahan Iklim, DNPI). Nongovernmental organizations, universities, and donors, also participated. Although there was a follow-up meeting after it was launched by inviting relevant ministries and agencies (such as the Ministries of Public Works and Agriculture), as well as related agencies such as the Provincial Development Planning Agency (Badan Perencanaan Pembangunan Daerah, BAPPEDA) and the Provincial Environmental Agency (Badan Lingkungan Hidup, BLH) in the provincial governments, there were "discrepancies between the status of RAN-API as documented and the stakeholders' views in some criteria, most notably the "assessment of climate drivers" and "assessments of the entitled capitals" (Kawanishi, Preston, & Ridwan, 2016, p. 102).

To visualize and then analyse the real power of players, this thesis uses MSIM and IIM. These frameworks provide simple but comprehensive insights regarding the power relationships among main stakeholders during the policy development process.

Given the wide variety of actors involved in decision-making, understanding the distribution of power among the involved stakeholders can arguably contribute to the effectiveness of achieving policy goals. Failure to identify which agencies have the potential to control other players might lead to insufficiencies "in moderating the negative impacts of climate change, [and policies that are] highly contested, less equitable, and ultimately less sustainable" (Sova et al., 2014, p. 2).

Developed by Sova et al (2014), MSIM uses circles within a pyramid to illustrate the relationship and dynamics of power. Every stakeholder is drawn in the circle with multiple colours. Each colour represents the groups each stakeholder comes from. For instance, yellow for governmental agencies, blue for bi/multi-lateral development agencies, red for NGOs, green for academics, and so on. The uppermost apex of the triangle means that these stakeholders have more capacity to influence policy output while the probability for "turf battle" or collaborative work is shown by the closeness of the circles that overlap with each other.

While in the Sova et al (2014) method the size of the circle represents the number of participants during focus group discussions, in this chapter we define the size of circle, borrowing from the Interest Influence Matrices Theory, as 'interest', or the degree that stakeholders consider the issues discussed as urgent or not (Gilmour & Beilin, 2007). Knowing 'interest' is important to have a clear image of the willingness of stakeholders to engage in specific issues. There is no guarantee that a powerful agency can persuade others because it depends on how that agency prefers to use its power (Reed et al., 2009). The instrument of 'interest' itself might be stand-alone or be a mix between political, financial, social, cultural, or specific skills in a particular field (Gilmour & Beilin, 2007). There are four kinds of stakeholder groups in the interest influence framework: 'Key players' (high interest and high influence), 'Context setters' (high influence but have little influence) (Reed et al., 2009).

Although a particular agency may have enough power, if the interest or internal circumstances are not conducive to taking a lead role in inter-sector collaborations due to a lack of such resources (for example, financial and technical skill as noted above) it could be a significant barrier to influencing others because of internal weaknesses. As Charbit and Michalun (2009, p. 152) argue: "institutions can only be effective if they have the necessary resources to implement policies and make use of policy tools". From this argument, the availability of resources within each organisation is crucial. In their study on REDD + policy in Indonesia, for instance, the most cited barriers regarding climate governance related to a lack of coordination, a lack of capacity, a lack of clarity of the forest-related legal system, and corruption (Mulyani & Jepson, 2013). Resources are crucial to support organisations to work with multi-actors, sectors, and to coordinate between jurisdictions.

Deciding which players fall into the category of "highly influential" or "least influential" is based on three elements: "access to international climate change funds", "access to international policy expertise", and "explicit mandates relating to climate change" (Sova et al., 2014, p. 19). First, the availability of an adaptation fund can arguably motivate local actors to consider adaptation to climate change into their development planning. The scarcity of funds is noted as the main barrier to adaptation (Barnett, Waters, Pendergast, & Puleston, 2013). Recently, many complaints have emanated from developing countries that their developed counterparts give more attention to mitigation rather than adaptation practices (UNFCCC, 2008). Considering the financial constraints in developing countries, having access to international funding agencies is considered as a way to influence other actors to follow their ideas. Hopefully, there will be additional funds for adaptation action for sectoral ministries. Conversely, the lack of adequate financial incentives can contribute to the ignorance from related sectors and actors as to adaptation actions.

Another determinant of power is the access to knowledge. Weber argued that "the primary source of the superiority of bureaucratic administration lies in the role of technical knowledge which, through the development of modern technology and business methods in the production of goods, has become completely indispensable" (Weber, 1978, p. 223). Discussing adaptation, understanding its cause, impact, and policy recommendations, are essential requirements (Brömmelhörster, 2010; Moser & Ekstrom, 2010).

It has been suggested that one way to enhance adaptive capacity is by "investing in information and knowledge, both in their production and in the means of distributing and communicating them" (Lemos, Boyd, Tompkins, Osbahr, & Liverman, 2007, p. 1). Information, together with human capital such as wealth, education, skills, and physical capacities such as good infrastructure and access to other resources, are necessary prerequisites for appropriate adaptation (McCarthy, 2001). Information regarding major aspects of climate impact, either historically or by way of future projection, should be accessible to all stakeholders, and its storage system has to be administrated well to avoid confusion. Good institutional systems can be seen, among other factors, by the process by which data are treated (collection, management, coordination, sharing, dissemination) (Hurlbert & Diaz, 2013; Yohe & Tol, 2002). In the words of Hurlbert and Diaz (2013), this is called "informational capital". According to Hurlbert and Diaz, poor data management and distribution leads to low institutional social learning.

There is a dearth of research regarding adaptation, mainly in developing countries; in particular, on the relationship between climate change and its impact in sectoral and local areas (Hulme et al., 2009). If institutions have adaptation-related knowledge, they can influence other players through awareness raising and dissemination of information which in turn could change their "every-day practices, behaviours and values as well as institutional changes, such as new policies, programmes, rules and decision-making procedures" (Lebel, Grothmann, & Siebenhüner, 2010, p. 334). Thus, it can be argued that how stakeholders create, mobilise or disseminate this knowledge will likely increase the capacity to influence others (Nay, 2012).

Another aspect of power is clear governmental mandates and duties to respond to climate change. To play a role in accordance with the authority that they have, institutions need to consider issues such as the "network, the source of its mandate, political will and the abilities of the people who represent the consortia of stakeholders" (Kosamu, 2013, p. 94). To avoid conflict, a clear job description and mandate for every organisation involved in an adaptation agenda is necessary (Salamanca et al., 2013). According to Masters and Duff (2011, p. 18), national governments face complicated governance challenges in the process of mainstreaming adaptation; one of them being "coordination within government departments as a result of conflicting and overlapping mandates".

In conclusion, the availability of resources within each line ministry is crucial to encourage the mainstreaming of adaptation in individual sectors. These resources include access to funding, the availability of information on the severity of climate-related impacts, technical knowledge, and explicit mandates to respond to climate hazards. A multi-stake holder analysis technique can help to identify and analyse the power, and the common barriers faced by each player, in order to build adaptive capacities and strategies. The next section presents the stakeholders' responsibilities for mainstreaming adaptation in Indonesia and analyses their power and influence in the policymaking process.

5.4 Background

In Indonesia, it is hard to identify which ministries have the authority to coordinate climate change policy. Every ministry has their own program for climate change particularly post-COP (Conference of the Parties) -13 in 2007 in Bali where Indonesia became the host (the key stakeholders for mainstreaming adaptation can be seen in Table 7). Due to nationwide publications and broadcasting throughout the country, there is increasing awareness especially among government officials about the impact of climate change on people's livelihoods. In the word of one informant "not only in the Ministry of Environment; at this time almost every ministry claims that they are green" (Interviewee 1AW). Since then, every ministry has tried to demonstrate their concern for these matters by establishing a special unit responsible for climate change. For example, in the Ministry of Finance, they have a Centre for Climate Financing and Multilateral Cooperation; in the Ministry of Marine Affairs and Fisheries, they established a Subdivision for Environmental Disaster Mitigation and Climate Change Adaptation. There is a Directorate General of New Energy, Renewable and Energy Conservation in the Ministry of Energy and Mineral Resources, and a Centre for
Climate Change and Air Quality in the Agency for Meteorology, Climatology, and Geophysics. Needless to say, in the Ministry of Environment, they have a Deputy Minister for Adaptation to Climate Change. Bappenas also has a Deputy Minister of Natural Resources and Environment. The reasons for these blossoming climate change related units in ministerial bodies raises questions about the motives behind their creation and their credibility. According to Sova et al (2014, p. 19), "motivation for action in the realm of climate change for these actors was based largely on the opportunity (i.e. increased funding availability)".

Ministry/Agency/Office	Responsibilities for Mainstreaming Adaptation
National Development Planning Agency (BAPPENAS)	Responsible for coordinating the evaluation and review of RAN-API, and to develop guidelines for the preparation of a regional climate change adaptation strategy.
Coordinating Minister for People's Welfare	In charge of coordinating and monitoring the Implementation of RAN-API with the involvement of the Minister and Governors (of provinces) related to climate change adaptation eff orts, and reporting the integrated implementation of RAN-API to the President at least once a year.
Minister of the Interior	In charge of facilitating the preparation of a regional climate change adaptation strategy with the Minister of Planning/Head of Bappenas and the Ministry of Environment.
The provincial government	Preparing the regional climate change adaptation strategy that refers to the RAN-API and is in accordance with local development priorities based on the ability of the budget and the public. The Governor communicates provincial climate change adaptation strategies to the Minister of the Interior and the Ministry of Planning/Head of Bappenas to be integrated into the national adaptation eff orts.
Local government	Integrating RAN-API and local governments' adaptation strategy/action plan
Indonesian Meteorological, Climatological and Geophysical Agency (BMKG)	Providing data and information about meteorology, climatology, air quality and geophysics in Indonesia. Its mandate includes supporting the mitigation and adaptation of climate change in the country. With the strong support from its centre for climate change and air quality (PIKU) and a subdivision of climate change information dissemination, BMKG is one of the leading institutions for climate change information. It disseminates local and regional information of the past, ongoing and future climatic changes.
The Indonesian National Council on Climate Change (DNPI),	Formulates national policies, strategies, programs and activities on climate change responses. The institution also coordinates activities including climate change disaster risk reduction and climate change information dissemination based on Presidential Regulation No. 46/2008.
Ministry of Environment	Facilitating sectors and local government to conduct vulnerability assessments. Providing vulnerability assessments at the national level through SIDIK (Vulnerability Index Data Online Information System). Increasing adaptive capacity in 15 pilot sites.
Ministry of Finance	Providing the funding instrument for climate change and fiscal policy.

Table 7: Stakeholders Responsibilities for Mainstreaming

Besides these units, Indonesia has established ad hoc organisations such as the National Council on Climate Change (NCCC/DNPI) and the Presidential Special Delivery Unit for Development Monitoring and Control (UKP4) that also has a special section for climate change, especially for mitigation issues (the head of UKP4 is the leader of the REDD+ task force). Some of the line ministries such as the Ministry of Public Works have initiated and formulated their sectoral policy and adaptation action plan (BAPPENAS, 2014). This situation eventually leads to the question of which institution is a national focal point for climate change and in charge of coordinating climate change policy.

Under Yudhoyono's presidency, there was a tendency to establish commissions and task forces to solve urgent issues considering the long process needed for implementing pressing policy. This long and complicated process of consultation/coordination is mostly related to the nature of power that diffused/fragmented into various ministries, agencies, and local governments. As one scholar notes: "there is a tendency in Indonesia to create new task forces and commissions, instead of holding leading officials accountable for the lack of progress" (Bunte & Ufen, 2008, p. 97).

These task forces were formed to "debottleneck" when issues needed inter-ministerial coordination and where usual governmental administrative routines were unlikely to succeed. It was also a way the president could claim that progress was being made on major issues that were receiving wide public attention (Datta et al., 2011). However, the immediate impact of this growing organisational structure is "overlapping jurisdictions, inefficient use of resources and competing for political interests with institutions inevitably colliding with one another" (Mangkusubroto et al. 2012 cited in OECD, 2012, p. 53). Coordination among top-level key ministries is not an easy task and bottlenecks are common (Datta et al., 2011). As a result, the mushrooming of ad hoc structures is a new barrier to long-term development strategies and also because it leads to ambiguous mandates and uncertainty amongst other players who are seeking to invest time and energy into coordination (Luttrell et al., 2012).

This confusion was clearly stated by a key staff of an international development partner based in Jakarta. As noted by that participant,

Compared to other countries, Indonesia has too many ministries and agencies. Some are permanent like Bappenas and some are temporary like DNPI. For temporary institutions, we never know what will happen after the President's term ends. It is very confusing. On the one hand, we have to plan very long-term, say between 20 to 30 years, but we never know how long this organisation will last. From outside the country, DNPI is a leading agency because they have a mandate for communication with UNFCCC, but inside, the actual power is held by Bappenas. So which is the main agency for coordination and communication" (Interviewee 3JC)

The lack of communication and coordination also leads to confusion among related ministries. For example, one respondent noted

DNPI was a focal point of UNFCCC but in making negotiations in international fora, they did not have enough information about the latest adaptation actions already done. This was due to a lack of coordination between Bappenas as a coordinator at the national level and DNPI. It looks like they are working in isolation from each other (Interviewee 1NR).

Another interviewee added that DNPI functions like a semi-private organisation which sometimes works without the expected priorities or concerns of government (Interviewee 1BR).

In relation to this unclear function and responsibility, the informant from DNPI thought that Bappenas should be the coordinator for adaptation given that adaptation is intersector and is closely related to development issues. The problem now, according to another interviewee employed in Bappenas (Interviewee 2AM), is weak leadership in Bappenas. Bappenas has the most authority to coordinate climate policy but struggles to manage this task properly because of the lack of human resources (Interviewee 2AN).

This is not a new issue in Indonesian climate change policy. This fragmented and overlapping mandate also happened in the case of mitigation (REDD+). Inter-organisation competition between the REDD+ task force, DNPI, and the Ministry of Forestry occurred because there was not a clear mandate to a specific organisation to coordinate a whole of government approach (Agung, Galudra, Van Noordwijk, & Maryani, 2014).

Currently, this is also the case with adaptation to climate change policy. As explained above, the major actors for adaptation are Bappenas for mainstreaming adaptation, DNPI for international negotiation especially under UNFCCC, and the Ministry of Environment (which, under a new president elected in 2014, has merged with The Ministry of Forestry).

5.5 Applying Stakeholder Analysis: Mainstreaming Adaptation

The discussion of the different players and their relationships in the preceding sections is captured in Figure 4. In this diagram, the influence of the organisations is

represented through their location towards the uppermost apex of the triangle. Power to influence other players is represented through the size of the circles, and the overlaps indicate strong relationships. The size of the circles is derived from interviews (qualitative assessment). The presence of many organisations towards the apex of the triangle indicates the attention and amount of funding that has flowed in, and into, Indonesia to develop climate change programs and policy.

5.5.1 Bappenas (National Development Agency)

Bappenas is perceived as the most influential agency in mainstreaming adaptation during the designing of the National Adaptation Strategy. The majority of respondents agreed that Bappenas should be a pioneer for formulating mainstreaming adaptation. The reason for this mainly relates to the mandate of law: no other agency could do such a task. Mainstreaming adaptation is a macro-level issue, and therefore Bappenas is the most appropriate lead institution. Additionally, the close relationship between adaptation and development planning ensures the importance of Bappenas due to its role coordinating development in Indonesia.



Figure 4: Multi-Stakeholder Influence Mapping Board

Why did the interviewees consider Bappenas to be the most influential organisation? First, Bappenas can influence almost all funding from international counterparts. Bappenas is the gateway for international donors to provide loans and grants; this not only relates to climate change, but also general development issues in Indonesia. Where the money for adaptation comes from is still not clear in Indonesia. According to RAN API, there are three sources of funds: domestic funding (state budget), private sector funding, and international donor funding. In fact, domestic sources for attaining the national development goals, as targeted in the national long and medium-term development plans, are not sufficient. The Government of Indonesia, therefore, looks for external sources of funding to fill funding gaps. Bappenas screens proposals to access international funding from ministries, agencies, local governments, and state-owned companies to assess whether the proposal accords with the priorities of the mid-term development plan (BAPPENAS, 2011). Due to its assigning duties for development planning and access to external funding, Bappenas is perceived as the most influential agency. This confirms Sova et al.'s (2014, p. 452) argument that "the actors and actor-groups identified as highly influential by central level respondents reflect the agencies primarily responsible for policy design and funding".

In addition, according to Charbit and Michalun (2009, p. 152) "without real financial means, the regulatory powers transferred to local governments will be not exerted. National agencies for better regulation depend for success on implementation at the local level." In the RAN API document, there is basically no clear explanation on how the adaptation activities will be financed. There is only a general description that sources of funds will be from local/domestic sources and donors. This leads to ambiguity in Bappenas itself about whether to encourage other players to adopt these adaptation programs. Bappenas seems hesitant to recommend any adaptation activities because there is no guaranteed source of funds; as noted by one interviewee: "Not all activities will be funded because of the scarcity of domestic sources" (2BS). On the one hand, Bappenas has to encourage others to adopt mainstream adaptation, but on the other hand, no additional funds are provided. This respondent further stated: "based on the mitigation experience, Bappenas now more carefully encourages local government to follow Bappenas' guidance. It can be said that the current adaptation policy is actually just labeling what has been already done by sectors as an adaptation" (Interviewee 2BS).

Limited funding is a reason for non-adaptation action; the availability of funding is widely cited as the crucial part of successful adaptation action. For developing countries where sources of domestic funding are scarce, access to foreign funding can often be regarded as a source of power and opportunity (Sova et al, 2014). Up to now, the amount of funding needed for adaptation in Indonesia is unclear. It can be caused by the difficulties to differentiate between adaptation finance and regular development activities (CPI-MoF, 2014).

Considering that scientific research is an integral part of adaptation regimes (Hegger & Dieperink, 2014), the availability of climate data is perceived as a source of power (Sova et al., 2014). Charbit and Michalun (2009) identifies the types of climate information that

should be available such as climate-related historical data, vulnerability assessments, future projections of climate change impacts, response options, and evaluation and priority systems. Hence, before dealing with adaptation, the most basic information needed is the vulnerability of the society and their surrounding environmental system (both social and natural vulnerability), and how far they can tolerate projected climate change impacts, especially through autonomous adaptation actions (Ananda, 2012; Charbit & Michalun, 2009; Dany, Bajracharya, Lebel, Regan, & Taplin, 2015; Klein et al., 2007). In short, it is undeniable that to be effective, decision-makers need reliable inputs for formulating, implementing and monitoring adaptation-related policies.

In relation to this, Bappenas published the National Development Planning: Indonesian Responses to Climate Change (Yellow Book) in December 2007 (revised in July 2008) and the Indonesian Climate Change Sectoral Roadmap (ICCSR) in 2009 as academic inputs for integrating climate change issues into the Medium Term National Development Plan (RPJMN) 2010–2014. The existence of reliable information, either climate-related data or vulnerability assessments, is important for decision-makers. It helps to select the best policy options or whether an intervention should be taken. The Indonesian government has realised the importance of such data as an integral part of formulating and implementing adaptation. For instance, BAPPENAS (2012) has highlighted the urgency to develop climate change impact related information for aquaculture and agriculture (under the food security sub-sector), health risk, and city risk assessment. In order to develop such information, Bappenas mostly relies on each sector to develop its own database.

Even though the Indonesian government has released such scientific knowledge, gaps still exist, particularly locally-based knowledge and more detailed information about the vulnerability of locations. In Indonesia, these knowledge gaps are mainly met by foreign donors either through international NGOs such as Mercy Corp, or bilateral development agencies like GIZ, ADB, and JICA. It has been Indonesian government practice for a long time to rely on donors for academic research input to policy (Sherlock, 2010). Related to funding issues, the involvement of donors for designing a national-level adaptation strategy has been seen as a benefit, although a respondent from MoE said that such donor funding for designing adaptation document is not necessary. "To make a document like RAN API actually we do not need help from donors. We are a big country, and we have resources and money for that. We should feel shame to ask donors for little things. Let the donors help us with something bigger" (Interviewee 1AW).

Bappenas, as stated in Law no. 25/2004 of the development planning system, is the leading and coordinating entity for development planning. Therefore, Bappenas is the institution that has the responsibility to mainstream adaptation into national development planning. However, Bappenas' authority is only for formulating development planning at the national level. Bappenas has no enforcement power over other actors or government sector bodies either at the central or lower levels to follow what has been stipulated in the RAN API document. This agency has no power to compel local government to adopt its direction. Bappeda (local development planning agencies) are not subordinate to, or under the control of, Bappenas but the Ministry of Interiors through provincial governors. Consequently, Bappenas has chosen the strategy of encouraging all related ministries and heads of local government to adopt RAN API as a foundation for their working plans (Rencana Kerja Pemerintah Daerah/Government Work Plan). The role of Bappenas is not really considered crucial by other agencies as budget allocation is in the hands of the Ministry of Finance.

Bappenas is the key planning agency but has no authority to ensure its plans are implemented by local government. So the power to act is divided between sectoral ministries. There is a lack of clarity as to who will oversee the achievement of targets across all levels of governments. An expatriate from a donor agency said that adaptation is not easy to be measured and to be quantified like in mitigation program (Interviewee 2NG). In such a situation, coordination becomes a big issue. As noted further by a respondent from this foreign donor, difficulties in coordination was a major contributor to the length of time needed to formulate and draft RAN API (approximately 2 years) (Interviewee 2NG). Although Bappenas has set up a working group for adaptation, this initiative is not effective. According to several respondents, this is because the issue of adaptation is still in its infancy or they only meet to prepare Indonesian delegations for international meetings (Interviewee 1AW).

It is acknowledged that Bappenas is the most powerful institution in the New Order era, but now its authority has been partially transferred to the Ministry of Finance. Some of Bappenas' responsibilities and functions overlap with this Ministry; therefore, Bappenas is forced to shift the strategies that it uses to coordinate development planning due to the presence of other players. Mainstreaming adaptation needs good leadership and a strong agency to coordinate all key players. In the case of Indonesia, there is arguably no single organisation capable of overcoming obstructions to coordination and communication. Decision-making processes in Indonesia can be characterised by strong siloism. Each unit works in isolation even when their jobs relate to other units and coordination is required. The post-Suharto era has brought chaotic decision-making processes with increasing numbers of new organisations, mostly ad hoc structures, to address emergencies, new priorities, or just to complement existing agencies that are not working optimally.

It is therefore suggested by many scholars that a national cross-sector coordination unit should be established in the Presidential Office. As discussed in Chapter Three, in the previous presidential era under Susilo Yudhoyono, UKP4 has a prominent role for coordination function. Under President Joko Widodo, this UKP4 has been merged with the Presidential Office but the real power of this new organisation is still unclear considering that it has no mandate to monitor the progress of every ministry to work according to the development priority, as UKP4 did.

Even though Bappenas has these three components (the mandate of law, access to international funding, and access to knowledge) thus can be treated as the powerful institution for mainstreaming, the story behind the scenes might be a little different. This is because the internal conditions in Bappenas itself impede them from utilising these powers. The most cited barrier mentioned by respondents is the lack of human resources. As one of the experts hired by the donor to help Bappenas design RAN API said, there are only five people in Bappenas managing adaptation issues at the moment (2AN). To overcome such limitations, Bappenas works closely with academics, mainly from Institut Pertanian Bogor (Bogor Agriculture Institute) and Institut Teknologi Bandung (Bandung Technology Institute). The involvement of experts from different backgrounds as acknowledged by Bappenas officials is in order to obtain more comprehensive data and recommendations as well as balanced opinions (Interviewee 1ID).

Under such circumstances, it can be concluded that although Bappenas has enough power to influence other players, there is a doubt internally whether they can encourage other ministries or local governments to incorporate adaptation into their day-to-day administrative routines. This is because Bappenas has no authority beyond development planning. Furthermore, the availability of resources and top-level presidential support to play the role of a leading institution for mainstreaming adaptation is also lacking (this will be explained later in this chapter).

5.5.2 The Ministry of the Environment

The Ministry of Environment (together with two other institutions: DNPI and the BMKG) is viewed as among the most influential ministries below Bappenas. In relation to the drafting process of the RAN API document, the Ministry of Environment plays a significant role in providing data and expertise because its job has a close relationship with adaptation policy and activities. Besides that, the Ministry of Environment has experience with the issuance of a similar document called the National Action Plan of Climate Change Mitigation and Adaptation (NAP-CCMA) in 2007. According to an interviewee from the Ministry of Environment, why MoE does not take a lead in the formulation of RAN API, because RAN API is a matter of planning so it was under Bappenas responsibility (Interviewee 1TN). While the mandate for Bappenas is for developmental planning, the Ministry of Environment has an explicit mandate for climate change and particularly for adaptation. The Ministry of Environment is powerful and could be categorised as a key player because it fulfils three criteria in terms of the mandate, access to funding, and knowledge.

MOE has constructed a vulnerability index for climate change called SIDIK to provide vulnerability data and to increase understanding of the risk from climate impacts. This a web-based information system (it can be accessed through http://adaptasi.menlh.go.id.) and can be used for local development planning to monitor the progress of such planning, and to analyse climate change vulnerability down to the village level. This vulnerability index may provide relevant information to help national and local-level decision makers as well as other stakeholders to make better planning and to respond with more effective implementation.

5.5.3 DNPI (National Climate Change Council)

Dewan Nasional Perubahan Iklim (DNPI) is considered as an agency that has an influential voice, particularly among development partners. Established by presidential decree, it has a wide range of membership. It ranges from the top level of a president as a chairman through almost all key players on climate change issues. DNPI was created to facilitate access to funding from international organisations. There were various activities including documentation and publication of their programs supported by donors such as GIZ, ADB, JICA, amongst others.

According to Presidential Decree No. 46/2008 (Article 3), the mandates of the DNPI are:

a) to formulate national climate change control policies, strategies, programmes and activities;

b) to coordinate the implementation of climate change control activities, which comprise adaptation, mitigation, technology transfer, and funding;

c) to formulate policy on arrangements for carbon trading mechanisms and procedures;

d) to monitor and evaluate the implementation of climate change control policies; and

e) to empower Indonesia in encouraging developed countries to be more responsible in tackling climate change.

Additionally, one of the most important mandates of DNPI is its role as the national focal point of the United Nations Framework Convention on Climate Change (UNFCCC).

When looking at internal issues within DNPI, a number of problems can be identified. As an ad hoc entity, their authority is limited because of the assumption that it is a temporary unit. Many respondents argued that DNPI will not be a lasting institution. There is no guarantee that the existence of DNPI will be extended under the new president and, indeed, after the election of President Widodo in 2014, DNPI was merged into the Ministry of Environment and Forestry with the justification that they had overlapping mandates. In this case, the employees of DNPI come from government officials (from ministries or agencies who work like consultants), non-government organisations, and research or academic institutions. In such circumstances, it is hard for other key climate change players from other governmental bodies to view or comply with rules and regulations if DNPI takes on the role of coordinating climate change policy. As a new unit with limited experience, DNPI cannot work optimally because of the previous roles and egos within the more settled institutions such as Bappenas. An example of this issue with the DNPI-Bappenas relationship is the wellknown story among climate change practitioners in governmental structural bodies that Bappenas never responded to DNPI invitations to its coordination meetings. Although its role remains sub-optimal, DNPI is a key player in the adaptation regime in Indonesia.

5.5.4 The Ministry of Finance

There are three reasons for the low level of influence of the Ministry of Finance. First, there is a lack of knowledge of staff, particularly in the Centre for Climate Change Financing (PKKIM). The attention is still on mitigation rather than adaptation and in 2015 there is no section for adaptation-related policy. Second, the PKKIM's head has given a low level of priority to the climate change initiatives. Even though the Ministry of Finance has established the Centre for Climate Change, the role of this Centre (PKKIM) sometimes conflicts with other centres in the Ministry of Finance itself. For example, when PKKIM raise the issue of the green economy, the head Agency may have different priorities. At the time of this research, they prefer to emphasise to the issue of fiscal sustainability; therefore, the Ministry of Finance will support policy initiatives so long as the fiscal condition is safe with, or without, the climate change label. An interview participant complained about this attitude: "It is true that climate change issues and the green economy will give much benefit in the long term, but if we cannot clearly define it and measure the progress on short time scale, I think it is hard to convince people and especially our boss" (Interviewee 1SY). Third, the Ministry of Finance was not invited to help design the RAN API. As noted before, the only agencies that engaged with the drafting and preparation stage were Bappenas, DNPI, the Ministry of Environment, and the Indonesian Meteorological, Climatological and Geophysical Agency (BMKG).

The Ministry of Finance is powerful due to access to funds, knowledge, and its mandate. However, because of their low interest in climate change policy, it can be assumed they play as 'context setters' or 'brokering'. This agency could move to be a key player if there is an increasing interest in mainstreaming adaptation in line with growing awareness among its employees about climate change issues (Ackerman and Eden, 2011).

5.5.5 The Ministry of Interiors

Given that the role of local government is pivotal in implementing adaptation action, the mechanism to ensure their engagement is also necessary. In Indonesia, a 'bridging agent' that has authority for coordination between central and local levels is the Ministry of Interiors. The Ministry of Interiors is responsible for aligning regulations issued by subnational governmental bodies to national policies. Hence it is important to look at the role of the Ministry of Interiors during RAN API policy formulation. As already explained, the Ministry of Interiors was not greatly involved in the RAN API formulation. The absence of the Ministry of Interiors was noted by Interviewee 3JC: "we are missing the Ministry of Interiors during RAN API design, but for the future, we will ask them to be more engaged in this agenda". Without the involvement of the Ministry of Interiors, it is questionable whether the Ministry of Interiors plays a critical role in coordination with local government, especially for law-making reviews related to taxes, fees, budgets and spatial planning (Butt, 2010, Buehler, 2010, Luttrel, 2012). This situation was expressed by a local government employee in Semarang: "according to me, compared to Bappenas, the Ministry of Interiors is stronger in relation to local government" (Interviewee LS2).

The exclusion of the Ministry of Interiors was also mentioned by a consultant working for Bappenas (Interviewee 2BS): "The Ministry of Interiors usually focuses on routine tasks; for the new issue such as adaptation, they do not get involved much either because they do not have staff who are responsible for this or they just do not want to engage". Another respondent added: "this is different to mitigation issues where there is a strong direction from the President, so every agency from the central to the local level will follow central instructions; the issues of adaptation is (arguably) driven by Bappenas with the assistance of international development partners" (Interviewee 3JC). In short, the Ministry of Interiors was sidelined despite its pivotal role in aligning regulations issued by subnational governmental bodies to the national policies.

There are similarities between the Ministry of Finance and the Ministry of Interiors in this case. Basically, they both have a high level of authority but a limited interest in pursuing climate change policy. Under the framework of influence and importance matrix, they can be categorised as 'context setters' or important stakeholders.

5.5.6 Donors and NGOs

External agencies can be either bilateral or multilateral organisations like JICA, GIZ, and ADB. Obviously, they have funds and knowledge, but no mandate. However, even if there is no stated mandate for adaptation both during policy formulation and action on the ground, external agencies have a mandate from international societies to influence particular countries (for instance through ODA) to assist with mainstreaming adaptation into ongoing national development plans. In Indonesia's case, they worked with Bappenas to influence other actors on how to adapt to climate impact in accordance with their perception.

Furthermore, given their capacity to access local government in terms of providing a fund for certain projects, this means that they can be seen as a 'key player' in the adaptation regime although they cannot directly influence the decision makers.

The contribution of NGOs in adaptation measures cannot be ignored. Their involvement either during policy formulation or in the implementation process is noteworthy. The power of NGOs relies on their ability to access international funding and through local engagement to have a deeper understanding of adaptation actions on the ground rather than other organisations. An opinion was expressed by an NGO activist that "We were greatly engaged during the RAN API formulation process. We even provided our staff to Bappenas to assist the RAN API secretariat" (Interviewee 6BC). NGOs can be involved as 'key players' with their knowledge and financial power. These two adaptation players will be discussed later in chapter Six and Seven.

5.5.7 Other Stakeholders

Other players such as academics and external development partner agencies have important roles too. They have, to a lesser degree, contributed in developing adaptation documents as "subject' (high interest but low influence). Academics, for instance, have the responsibility of providing basic information, credible climate information, collecting data from related ministries, drafting, and finalising RAN API documents. The involvement of experts, usually academics from influential universities such as Bogor Agriculture Institute (IPB) and Bandung Institute of Technology (ITB), is essential in "the production and supply of knowledge" (Sherlock, 2010, p. 9). Academics and research groups have a low level of influence but have a high interest in adaptation. This can be placed into 'the subject' (useful for policy formulation) category. These actors can have influential power if they work closely with other key players, but they still have no real power because they lack significant access to funds and a mandate (Reed et al., 2009).

Other organisations such as the Climatology and Geophysics Agency (CGA), the Ministry of Forestry (MoFOR), the Ministry of Public Works (MPW), the Coordinator Ministry of Economic (CME) play only a minor role in adaptation initiatives. For example, the membership and engagement of the Climatology and Geophysics agency in the drafting process of the RAN-API document was mostly as a data provider (rather than policy maker). The Ministry of Public Works and the Ministry of Agriculture (MAG) were mainly implementers or users of this adaptation document.

5.6 Conclusion

The development of a national adaptation strategy through RAN-API is an important part of overall efforts to cope with climate change impacts in Indonesia. This national adaptation document serves as a basis for sectoral ministries and local governments to incorporate adaptation into their major development objectives. As discussed in the literature review chapter, regulation at the national level is critical to secure mainstreaming. The national level is important for many reasons; for example, establishing regulation, providing financial incentives, encouraging information sharing, and handling cooperation with international partners. The importance of a national authority enforcing coordination both horizontally and vertically is also highlighted in many studies (Bulkeley & Betsill, 2005; Hogl, Kvarda, Nordbeck, & Pregernig, 2012).

This thesis finds that a national adaptation strategy provides a weak impetus for adaptation actions. The absence of a legal basis and a clear mandate from the central government authority to respective stakeholders to develop a climate change adaptation agenda is an example of this weakness. It is left to local governments and line ministries to take the adaptation initiative as a voluntary program (Chapter Six will investigate the reasons why some municipalities respond to climate change impacts while others do not). This thesis identified four perceived reasons why central government finds it difficult to provide clear signals relating to adaptation policy. The challenges can be understood in the context of wider governance issues in Indonesia.

First, no single ministry has the responsibility to ensure that adaptation plans will be implemented. For the participants in this thesis, the absence of an effective leading agency responsible for coordination functions generated a negative perception on the importance of this adaptation agenda. This perception was influenced by the absence of influential actors (for example the President's office, the Ministry of Finance, and the Ministry of Interior) relating to a national adaptation strategy. The role of Bappenas as a key planning agency was perceived as weak which was attributed to the combination of low institutional capability and the lack of authority

In terms of the absence of a lead agency, adaptation literature has demonstrated that the presence of government institutions at a national level who work effectively is key for increasing adaptive capacity in a nation (Dixit, McGray, Gonzales, & Desmond, 2012). No obvious lead agency can hamper "communication, cooperation and coordination between different stakeholder groups and compromises between numerous and sometimes conflicting objectives" (Oates, 2011, p. 5). In their study of mainstreaming climate change adaptation in South Africa, for example, Pasquini, Cowling, and Ziervogel (2013, p. 231) suggest that "Since the roles and responsibilities of local government are defined by national government, the latter must mandate that local government mainstream adaptation to climate change, and also provide the appropriate resources to this end". According to Dannevig, Hovelsrud, and Husabø (2013, p. 503) "Without clear guidance and incentives from the national level, adaptation to climate change in municipalities will continue to be treated in a haphazard manner". An important lesson demonstrated in this chapter is that just because an agency is powerful does not mean that it has the capacity or potential to coordinate across ministries and jurisdictional levels.

Second, the issue of a lack of accurate and detailed data on recent and future scenarios which has been highlighted as preconditions for mainstreaming (for example: Ayers, Huq, Faisal, & Hussain, 2014; Dany, Bajracharya, Lebel, Regan, & Taplin, 2016) was recognised as a key challenge. The adaptation issue is characterised by high reliance on scientific information (Klein & Juhola, 2014). The existence of risk assessment has been identified in the literature (O'Brien, Sygna, & Haugen, 2004; Rød et al., 2012) as an important input for adaptation planning. To conduct this assessment requires expertise, funding, and coordination between line agencies where the availability of these resources are generally lacking at a local level (Baker et al., 2012). Although national government (the Ministry of Environment) has provided some information regarding these potential hazards, there is little detail. The absence of a detailed vulnerability assessment makes it difficult for local development planners to determine effective adaptation programs. Research on adaptation has highlighted that uncertainty regarding climate change impacts can result in wait-and-see rather than action (Klein & Juhola, 2014).

Third, a further challenge was the perception that mainstreaming of adaptation is part of regular adaptation activities. Hence it did not need a legal framework (and additional funding). These perspectives add an important insight as to why the national government fails to provide a stronger position on the adaptation compared to, for example, mitigation policy. Informants from Bappenas and development partners, for example, claimed that RAN-API serves as a basis for the formulation of a medium development plan. When adaptation was formally incorporated into this 5-yearly development plan, mainstreaming adaptation has been part of the ongoing development activities so a separate legal basis was not required. This position has resulted in the absence of a Local Adaptation Plan (LAP). Without a local adaptation plan, there has been a disconnection between national strategy and local action. One implication of this is that adaptation has not been put on local political agendas.

In previous literature, the legal framework at the national level is identified as an important driving force to anchor adaptation into local development planning (Salamanca et al., 2013). Slow adoption of adaptation at the local level is also caused by a blurred mandate and the lack of understanding how mainstreaming could happen in practice and what kind of preconditions are needed. National authorities should be aware that mainstreaming of adaptation need clear guidance in operational levels and adaptation is not the only priority for many local development planners.

Fourth, the finance and knowledge gap was perceived as a challenge. There is a lack of clarity when it comes to local-level financing for climate change adaptation (AUSAID, 2010). According to RAN API, there are three sources of funds: domestic funding (state budget), private sector funding, and international donor funding. In fact, domestic sources for attaining the national development goals as targeted in the national long and medium-term development plans are not sufficient. The Government of Indonesia, therefore, looks for external sources of funding to fill funding gaps. Up to now, there are no policies on funding for adaptation to climate change adaptation that have specifically been developed for supporting the implementation of the action plan on adaptation in Indonesia (RAN-API). Policies on funding of climate change adaptation are part of the policies on usual development as a whole that are based on the annual development plans of the central, provincial, and district/city governments (BAPPENAS, 2012). In this case, with no financial support from central government to facilitate adaptation, the real action at a local level will depend on third party entities (such as donors and development partners) in designing and implementing climate adaptation action (this will be discussed in the next chapter).

It should be highlighted that Indonesia is in the early stage of mainstreaming (in the stage of policy formulation or policy planning). As highlighted by Ayers et al. (2014), to build national capacity for mainstreaming of adaptation, approximately between 5 to 7 years is needed. Additionally, they argue that to make mainstreaming adaptation part of "business as usual" requires three preconditions or pathways: awareness raising (generating scientific evidence to help in problem solving of decision makers), the availability of climate-related information (user friendly data for decision makers), and pilot activities (to provide lesson learn about "what adaptation might look like"). In practice, these steps are not in sequential

order but are "a patchwork of processes, stakeholders and approaches that converge or coexist" (Ayers et al., 2014, p. 302). As such, the national government cannot ignore the fact that mainstreaming is a messy process, and often a non-linear or non-sequential process, that needs continual dialogue between national and local stakeholders about the day-to-day reality (real life indicators) to facilitate adaptation uptake.

Therefore, the explanation above is specific to the current situation. For example, the categorisation of Bappenas as the most influential agency is currently correct, but it is possible that new scenarios will emerge following the implementation of an adaptation policy.

This study concludes that this national adaptation strategy could not provide the appropriate support and enforcement for line ministries and local government to adopt mainstreaming. As argued in Chapter Three, the presence of a national adaptation regulation and policy is critical for achieving action on the ground. Equally important is the existence of a lead agency at the national level to enforce coordination both horizontally and vertically.

In sum, there was a lack of collaboration among relevant government ministries during the designing of RAN API. It was also noted that the stakeholders' engagement in the design process of the document was focused only on a limited number of Ministries at the central level. This limited engagement of relevant stakeholders and the exclusion of local stakeholders has implications for the low level of awareness and low ownership among them (this will be discussed in the next chapter).

Chapter Six: Comparing Adaptation Development Strategies: Four Case Studies

6.1 Introduction

This chapter investigates why some municipalities willingly respond to climate change impacts while others are reluctant to initiate adaptation. Understanding the motives for adaptation uptake in developing countries is important for central government, donors, and NGOs to assist and provide the most effective mechanisms for encouraging responses from local actors. This chapter argues that the mainstreaming of adaptation, particularly at an early stage of developing adaptation plans, requires a strong mandatory regulation (command and control mechanisms) from a higher authority. A voluntary system is unlikely to work when resources (human and financial) are lacking at municipal levels. In case the national impetus to facilitate local action is weak, the role of local elected leaders is crucial in steering the mainstreaming of adaptation.

This chapter is divided into three main sections starting with a literature review involving the motives and ambitions of local actors for undertaking adaptation. The second section provides an overview of the study areas in terms of their geographical setting, socioeconomic aspects and their current climate hazard and potential in the coming years. The third section will analyse the local stakeholders' perceptions of the need for undertaking adaptation.

6.2 Mainstreaming Climate Change Adaptation at the Local Level

The aim of this section is to highlight the key role of local government in adaptation actions in a policy process. The importance of local government in designing and implementing adaptation initiatives is reviewed. This section argues that the motives and ambitions of local actors for undertaking adaptation are determined, in part, by internal and external factors. Internal determinants include leadership capacity, the severity of exposure to catastrophic climatic events, and the resources available. External factors include third party support to provide adaptation funding and engage adaptation experts.

Recent research has investigated why some local authorities willingly respond to climate change impacts while others are reluctant to initiate adaptation (Juhola, Haanpää, & Peltonen, 2012; Rauken et al., 2015; Shi, Chu, & Debats, 2015; Wejs et al., 2014). For

instance, in their study on mainstreaming adaptation in Norwegian municipalities, Dannevig et al. (2013, p. 490) found that "adaptation planning has progressed more in those municipalities where officials are engaged and actively seeking external expertise and support". Wejs et al. (2014) found very similar results regarding the importance of institutional entrepreneurs in municipalities in Norway and Denmark where national adaptation policy is weak. As adaptation programs are still at an early stage, including those in the countries considered to have a high level of adaptive capacity (Picketts, Curry, & Rapaport, 2012), there is little research on the motives and ambitions of local actors for undertaking adaptation and the reasons for their engagement in developing countries.

As discussed earlier, adaptation policies can take different forms for different countries depending on their social and environmental context (Moser & Boykoff, 2013). They should be "comprehensive at a national level, addressing adaptation across sectors, regions and vulnerable populations, or it can be more limited, focusing on just one or two sectors or regions" (Niang-Diop & Bosch, 2005, p. 186).

There has been an abundance of studies on the barriers to implementing adaptation (Antwi-Agyei et al., 2014; Clar, Prutsch, & Steurer, 2013; Lehmann, Brenck, Gebhardt, Schaller, & Süßbauer, 2015; Massey, Biesbroek, Huitema, & Jordan, 2014; Measham et al., 2011). Scholars have tried to classify these barriers. For example, Clar et al. (2013) identified six crosscutting barriers within four stages of the policy cycle: a lack of political commitment, inadequate or unclear responsibilities, inadequate cooperation, insufficient resources, a lack of evidence or certainty, insufficient knowledge-brokerage and a lack of networking.

High cost, complexity, and institutional fragmentation are cited as barriers to adaptation (Eisenack et al., 2014). A greater ability to address the local impacts of climate change requires an understanding of the potential threats. This means that the implementation of vulnerability assessments is crucial. To conduct such an assessment, it is usually beyond the local officers' capacity. Hiring experts to prepare vulnerability assessments, and then to implement adaptation practices, can only be accomplished by having sufficient funds. That is why adaptation at the local level mostly takes place in bigger cities or regions (Keskitalo, Juhola, Westerhoff, Scholten, & Ashgate, 2013; Rumbach, 2016). Larger cities usually have more resources to manage risks and hence more resilience to disaster (Cross, 2001). Moreover, there is "a tyranny of distance" which means less emphasis is given to disaster risk

in regions with "physical, cultural, and political separation from centres of power and influence" (Rumbach, 2016, p. 111). However, it was also found that even municipalities with higher adaptive capacity and sufficient resources, adaptation policy-making is still in its early stages (Picketts et al., 2012).

As discussed in Chapter Two, mainstreaming is based on the suggestion that adaptation is best achieved through integrating adaptation into local development policies. In practice, this is mainly accomplished through multi-level, interagency coordination and cooperation across the different layers of government (Bauer & Steurer, 2014). Studies on adaptation actions at the national level, for example, have highlighted that often such policies do not make a clear statement about the roles and responsibilities of lower-level authorities (see for example, Biesbroek, Klostermann, Termeer, & Kabat, 2011). National adaptation policy does not automatically lead to local implementation due to an "institutional void" (unclear roles and responsibility cause delays in implementing effective adaptation) (Measham et al., 2011). Shi et al. (2015) argue that the presence of adaptation policies at a higher authority level is not a strong predictor of the practices and outcomes of lower-level municipalities. When the adaptation agenda consists of advice without regulatory power and no mandatory adaptation measures, the central and provincial government is unable to enforce local authorities to manage climate impacts. This is the case in developed and developing countries. According to Anguelovski, Chu, and Carmin (2014, p. 156), adaptation planning "is one of the most complex and intricate challenges that cities are currently facing". Adaptation measures are often perceived as "beyond the capacity of many local governments" (Baker et al., 2012, p. 128). When the objectives are not clear, it is likely that local governments will delay action.

6.3. Adaptation is Local: a Major Conclusion

In short, adaptation is local. The challenge is that policy preferences may differ among local governments. Local governments have different backgrounds in terms of their geography, organisational/administrative structures, capacities, and goals. These, in turn, will influence their ability to anticipate and cope with the impact of climate change. For example, inadequate capacity (lack of fiscal capacity, adaptation expertise, and leadership and guidance) can undermine the willingness to adapt to a changing climate. Previous studies; for example Moser and Ekstrom, 2010, have highlighted the importance of political leadership at an early stage of adaptation and in the absence of mandates, regulations, clear job roles, and low public demand. In addition, experiences with weather-related natural disasters have pushed the local authorities to invest in some adaptation projects to lessen their effects (Dannevig et al., 2013; Lujala, Lein, & Rød, 2015). Another important driver for adaptation in developing countries is the interventions from international funding agencies; for instance, to facilitate the roadmap for cities' adaptation strategies and provide funding for adaptation pilot projects (Anguelovski et al., 2014).

6.4 General Description of the Study Sites

The primary focus of this chapter is why some municipalities aggressively pursue adaptation while others do not. As discussed in Chapter Three, through regional autonomy, the central government devolved both responsibilities and resources to municipalities— Kabupaten or rural districts and Kota or urban districts—rather than to the Provinces. Using four municipalities (two urban cities and two rural regencies) as case studies, this chapter examines how and why these municipalities adopt different paths for reducing their vulnerability to the impacts of climate change (see Figure 5).





(Adapted by author from: http://asiapacific.anu.edu.au/mapsonline/base-maps/centraljava.pdf)

This thesis was conducted in four locations representing urban, suburban, and rural areas. It investigated four municipalities: Semarang City, Pekalongan City, Temanggung Regency, and Tegal Regency. A city is an urban-based district characterised by a dense population in its demographic, smaller in its size, and mainly based on service and industry in its economic structures⁵. Conversely, regencies are generally rural areas and with agricultural based economies⁶.

Semarang City is a coastal, highly-populated region and the centre of economic and industrial activities with its population exceeding 1.59 million in 2015 and annual growth rate being 0.65% (BPS-Kota Semarang, 2016). As explained earlier, this city is the capital city of Central Java Province and has experienced significant impacts of climate-related hazards. The climatic hazards in this city include frequent riverine floods, permanent coastal flooding, landslides, and droughts. A further impact of climate change in this city is the spread of vector-borne diseases and health problems.



Figure 6: Land Subsidence and Coastal Inundation in Semarang

(Photo Credit: Author)

⁵ In this chapter the terms districts, cities, municipalities or local governments are used interchangeably to refer to administrative governmental structure below provincial level

⁶ The classification of cities based on population size according to law no 26/2007 are: metropolitan city (population more than 1 million), large city (population between 500,000 and 1 million), medium city (population between 100,000 and 500,000) and small urban (population between 50,000 and 100,000).

Semarang City is one of the pilot sites for mainstreaming adaptation in Indonesia and has integrated climate adaptation into their 5-yearly development plans (Mid-term Development Plan). Moreover, this city established a climate change adaptation working group that engages a wide range of stakeholders from various backgrounds (line agencies/governmental offices, NGOs, academia) to manage climate change impacts.

As for the second case study, Pekalongan City is on a coastal plain dominated by lowlying areas with elevation about 1m above sea level. Geographically, this city is located 101 km west of Semarang City and 384km east of Jakarta. The city is surrounded by two regencies: Batang Regency and Pekalongan Regency and the Java Sea in the north; it encompasses a relatively small area of 45.25 km. Pekalongan City has four sub-districts and 47 villages. In general, fishing and batik production is the major source of income (BPS-Kota Pekalongan, 2016; UN-HABITAT, 2012). This city is the primary producer of batik, and supplies around 60% of all batik made in Indonesia (UN-HABITAT, 2012). According to statistical data (BPS-Kota Pekalongan, 2016), Pekalongan has numerous schools and colleges (844 primary school classrooms), a junior high school (389 classrooms), a senior high school (142 classrooms) and seven colleges. The primary school net enrolment rates were 94.55% in 2015; junior high school enrolments were 79.99% and senior high school enrolments were 47.84%. In the health sector, there were seven hospitals and one child birth clinic, 52 Family Planning Clinics/Polyclinics. There were 265 doctors and 29 dentists in 2015 and life expectancy was 74.09 years in 2014.

According to statistical data, the average population density was approximately 6,554 people per km² in 2015 with an annual population growth of 0.96% (BPS-Kota Pekalongan, 2016). The unemployment rate was around 4.10% in 2015 and 8.02% of people were living below the poverty line in 2014 (BPS-Kota Pekalongan, 2016). According to a survey conducted by UN-HABITAT (2011), urbanisation and high population density have led to a rising demand for housing. This expanding need for housing was provided mainly through the conversion of agricultural land resulting in a lack of green and open spaces.

The high rate of poverty (8.02% in 2014) and the unemployment rate (around 4.10% in 2015) have contributed to a high number of people living in substandard housing. Based on a vulnerability study conducted by SMERU, around 10% to 13% of people live in a house less than 8 m² per person (the figure of $8m^2$ is in accordance with the government standard for healthy and clean life behaviour program) (Akhmadi, Rahmitha, & Wahyu, 2012).

Furthermore, a study by UN-HABITAT (2012) found that residential use accounts for 60% of the city area and only 0.8% of open spaces.

Pekalongan has already suffered from climate change impacts. Increasing rain and sea levels have caused floods and coastal inundation. This occurred because a watershed system that flows from Dieng Mountain in the southern part of the city has to pass through the city center to drain into the Java Sea. The high level of runoff from this watershed system during monsoon rain causes riverine flooding and river sedimentation. The first large flood in Pekalongan, for example, occurred in 1972 and caused severe damage as water up to 70 cm flowed to the residential areas (Akhmadi et al., 2012).

Sea level rise has caused coastal inundation and erosion. These coastal hazards have brought a loss of economic benefits and biodiversity (see Figure 7). Coastal erosion, which is estimated to be around 10.5 m from 2003 - 2009 for example, causes crop failure, damage to aquaculture and damages to mangrove forests (Marfai, 2014). Coastal inundation also negatively affects people's livelihoods such as the damage to roadways and equipment, disrupted physical circulation, and reduced productivity. Degradation of the mangrove ecosystem results in the loss of a buffer zone for natural protection from tidal flooding and coastal erosion (Marfai, 2014).



Figure 7: Pekalongan Coastal Erosion Between 2003-2009

(Source: Marfai, 2014)

Pekalongan is surrounded by seven rivers which are the Pekalongan River, the Banger River, the Baros River, the Dekoro River, the Asem Binatur River, the Bremi River, and the Sebulan River. These rivers are mostly overly polluted, and are full of rubbish from households. As much of the city is located on a flat terrain, the water cannot flow swiftly to the North Sea. The problem of water pollution is further exacerbated by the heavy sedimentation due to a lack of maintenance.

The immediate impact of the inadequate drainage infrastructure, exacerbated by inundation, was the increase of standing water, clogged drains, and water-logging in the neighbourhood, resulting in salinized contaminated groundwater and soil as well smelly water (UN-HABITAT, 2011). The current non-functioning drainage system and inundation also affected the population indirectly in several ways including disturbing the local economy due to reduced agriculture productivity and home industry, spreading waterborne disease, and disrupting public services. According to one of the interviewees who lived in the hazard-prone areas: "flooding due to excessive rains or river overflowing will recede in a short time but inundation due to tidal floods can occur for months" (Agus, Kandang Panjang's resident).



Figure 8: Coastal Inundation in Pekalongan (Photo Credit: Prabowo, 2016)

In such a situation, the population relied on a neighbourhood-managed artesian well system (UN-HABITAT, 2011) or bottled drinking water (Akhmadi et al., 2012) because ground water sources were contaminated by saltwater intrusion and batik dyes (UN-HABITAT, 2011). In this regard, PDAM (Perusahaan Daerah Air Minum) as the city's clean water supply company can currently only provide around 49% of the needed water (BPS-Kota Pekalongan, 2016). According to an interviewee from BLH, there are more than 200

artesian wells in Pekalongan City. These extensive groundwater extractions have contributed to land subsidence (see also Chaussard et al., 2013).

Pekalongan City has a strong commitment to addressing these risks. To help improve its capacity to plan and implement adaptation programs, this city was cooperating with local NGOs (BINTARI), international development partners (JICA, GIZ), a local university (Islamic State University of Pekalongan) and the City Government Association (APEKSI). Pekalongan also participates in international collaboration to deal with climate-related hazards at a local level through the Durban Adaptation Charter in Bonn in 2013.

There are numerous adaptation actions that have been conducted by the Pekalongan City government to lessen such climate impacts. These include a mangrove replanting program, sea wall construction, affordable public housing, and a river walk upgrading project (see Table 8)

Adaptation Activity	Description
Mangrove conservation	Over 300,000 mangrove seeds have been planted to establish the mangrove conservation area. In 2010, the Ministry of Marine Affairs and Fisheries' mangrove replanting program, called "Ayo Tanam Mangrove," replanted 10,000 mangroves in Pekalongan's coastal areas. Local community groups and organizations, including students and private businesses, have also contributed to replanting efforts
Panjang Baru sea wall	The Panjang Baru Sea Wall was built to reduce the impact of coastal erosion in northern Pekalongan.
The Podosugih Riverwalk slum upgrading project	This project was recognized at the national level for integrating health, water, public realm, and housing improvements
Jetayu park development	This public park provides open space, pedestrian areas and road improvements
Mataram area park upgrading	This upgrading program provides basic services (by improving pedestrian areas, the drainage system and managing the street vendors) and open spaces to residents and visitors.

Table 8: Examples of Adaptation Actions in Pekalongan City

Construction of Kauman	Waste water from Batik industries is treated before
village wastewater	being discharged into the river. This water treatment
treatment plant	serves 25 Batik producers.
Slum Upgrading	Improving housing quality for the poor through three main approaches: the Rumah Aman project which is financed by provincial and national government for communities vulnerable to coastal flooding; a Rusunawa (public housing apartments) program for poor families at an affordable rent price; the Bedah Kampung program (maintain and repair homes) and encourages savings activities in slum areas

(Source: UN-HABITAT, 2012)

In sum, Pekalongan's socio-economic and geographical location makes it vulnerable to the severe impacts of climate change.

Turning to the third case study location, Temanggung is a medium city of 745,778 people (BPS-Temanggung, 2016) located on the mainland and is dominated by mountainous farming landscape, rural villages and sparsely-populated settlements. The total area of the regency is 870,650 km² with an altitude ranging from 500m above sea level (masl) to 1450 masl. Temanggung is located at a distance of 80km from Semarang City. According to the 2015 statistical data (BPS-Temanggung, 2016), the average population density was about 857 people per km² with an annual population growth of 0.93%. The average household size was 3.82 people 2015. The 2015 statistical data reported open unemployment of 1.5% in 2015, 3.19% in 2014, and 4.87 in 2013. Around 11.76% of households were living below the poverty line in 2015 (BPS-Temanggung, 2016). The data further revealed that only 20.30% of households had access to piped water (2015); the majority relied on spring water (43.63%), and water ground sources (33.7%).

A census conducted by the statistics agency BPS-Temanggung (2016) shows that in 2015 the primary school net enrolment rates were 99.68%, junior high school enrolment rates were 96.83%, and senior high school rates were 52.11%. Temanggung is a mountainous area with an average temperature ranging from 20°C to 30°C. The census data shows that agriculture, mainly tobacco and coffee, were the backbone of the economy. The area was referred to as the *kota tembakau* (tobacco city) because of its high quality tobacco production. Around 47.2% of households depended on farming as their source of income in 2014, while in 2015 this number decreased to 39% (BPS). Although a large group of people depend on

climate-sensitive sectors such as agriculture, the impact of climate change has not been considered as a major threat.

In such a mountainous terrain, small-scale landslides and storms have occurred but no large hazard has ever been reported. In general, according to a vulnerability assessment by MoE, this site can be categorised as having a low risk of climate impacts. Temanggung is administratively divided into 20 subdistricts, 266 villages, and 23 kelurahan. The data from an information system of vulnerability index (SIDIK) shows that from the total number of villages in Temanggung, 46 villages were not vulnerable, 138 villages were low risk, 105 villages were medium risk, and no village was high or extreme risk. This regency has not adopted mainstreaming adaptation into their local budget or medium- term development planning.

The fourth case study, Tegal Regency, consists of a mix of coastal locations and mainland as well as hilly landscape suburb areas with an altitude ranging from 0 - 1,700m above sea level. Tegal Regency has an area of 878,7 km² and lies between longitude 108°57'6 to 109°21'30 east and latitude 6°50'41" to 7°15 15'30" south. Tegal is currently divided into 18 sub-districts, 6 kelurahan and 281 villages. This regency is located at a distance of 195k west of Semarang City.

In 2014, Tegal was inhabited by 1,420,132 people with the average population density being approximately 1,616 people per km². The average family size was 3.77 people (BPS-Kab Tegal, 2016) and the annual population growth was 0.70% between 2013 and 2015. The unemployment rate was 9.52% in 2015 and 10.75% of their population lived below the poverty line in 2012 (BPS-Kab Tegal, 2016). The data further show that life expectancy at birth was 69.58 years; and Tegal had an adult literacy rate of 90.1% in 2014. The mean educational status was 7.2, lower than the national average of 7.84 (BPS-Central Java, 2016). The currently piped water service only reaches 12.39% of households. The source of incomeearning activities of inhabitants largely comes from trading (28.8%), agriculture (25.5%), and small-scale manufacturing industries (19.2%) (BPS-Kab Tegal, 2016). This regency is characterised by a high number of migration of its residents, especially to Jakarta. Mostly they run small businesses known as *warung tegal* (a small restaurant selling Javanese dishes and rice with a cheap price; popular among the lower socio-economic class such as blue collar workers).

While outbreaks of infectious diseases have been reported in this regency, no large climate-related hazardous event is yet to be recorded. For example, there were 526 cases of dengue fever; four deaths have been reported in 2013. According to the vulnerability assessment conducted by MoE, the majority of people (around 86.7%) live in the area that can be categorised as medium risk (249 villages) and there is only one village in extreme risk to climate hazards. Hence, this regency is at low risk of climate change effects and, to date, the municipality has not prepared for adaptation activities. According to a respondent from BLH, the current environmental program is mainly related to waste and garbage disposal management.

While Semarang and Pekalongan are urban, coastal and vulnerable to the changing climate, Temanggung and Tegal are inland, rural towns characterised by small, dispersed populations and slow economic growth with low climate hazard risks. The economy of these regencies is strongly tied to agricultural activities.

As was established in Chapter Three, Indonesia's climate policy has focussed on mitigation (reducing emissions) rather than adaptation. Due to this policy, Indonesian local governments have been more familiar with mitigation strategies, introducing a mandatory national scale policy to reduce emissions by 26% from Business As Usual (BAU) by 2020 or 41% with international assistance. Accordingly, adaptation processes are new concepts for local governments. The adaptation agenda gained momentum after the UNFCCC COP 13 meeting in Bali in 2007 that emphasised integrating adaptation into environmental planning. The increasing attention to adaptation is also due to the awareness of multilateral and bilateral agencies and donor countries seeking to mainstream adaptation into their development assistance, including Indonesia. As national governments tend to prioritise mitigation, adaptation had not received attention until 2012 when the government released a national adaptation programme of action (NAPA) called RAN API (Rencana Aksi Nasional Adaptasi Perubahan Iklim). This was a formal response to the potential impacts of climate change. The document emphasised the need for adaptation as the threat of climate change would be significant in terms of economic and environmental loss (BAPPENAS, 2012). As discussed in previous chapters, such national guidance to mainstream adaptation into existing local development planning was released officially in 2014, but there were no clear directions or obligations for local municipalities to adopt or mainstream adaptation. In such a situation, adaptation was generally poorly understood. This raises questions about how to respond and who should be involved.

6.5 Local Actors' Perceptions about the Need for Adaptation Initiatives

This section examines the perception of local-level stakeholders on the urgency of adaptation programs. Drawing from the adaptation policy literature discussed in Chapter Two, there are crosscutting barriers that can serve as constraints or enabling factors for local adaptation (Moser and Ekstrom, 2010). This thesis has identified four main drivers (or barriers) in determining the process of mainstreaming of adaptation within the case study areas: (1) forward-looking leadership; (2) exposure level (extreme weather experiences) (3) third parties interventions; and (4) the availability of resources. The following sub-section will discuss the key elements that encourage municipalities in the study areas to adopt adaptation.

6.5.1 Leadership

The leadership roles in mainstreaming adaptation have been a central concern in the literature (Meijerink & Stiller, 2013). Individual capacity, either from local political leadership such as a Mayor or policy entrepreneurs (issue champions within governmental bodies) are instrumental for adaptation practices (Holgate, 2007; Stiller & Meijerink, 2013). Leadership is particularly important at an early stage of adaptation and, more importantly, in the context of the absence of mandates, regulations, clear job roles, and low public demand (Moser & Ekstrom, 2010). With strong commitment and direct involvement from elected officials, adaptation can attract considerable attention and resources (Smith, 2010).

According to informants in this thesis, leadership is primarily from the *kepala daerah* (head of the municipality). Addressing climate adaptation in Semarang and Pekalongan has been shown by the willingness of the Mayor to undertake local actions to reduce risks. A general observation from the interviews indicates that the direction of the Mayor was an important source of support to mainstream adaptation into medium and long-term development goals.

In Semarang and Pekalongan, adaptation was present in their development planning, and in some cases it had been implemented. These cities are front runners in Indonesian climate change adaptation and had a good leader (Mayor) to initiate the process. In terms of the role of this elected official, interviewees expected that his commitment can force each agency to start engaging with climate change impact in their daily routines leading to a longterm planning horizon and hence reducing current and future vulnerability. An interviewee work for BLH Pekalongan, for example, commented that

In almost all development agendas, not only with climate change issues, commitment from the chief executive is crucial. If the Mayor has a strong commitment, others will follow. The involvement and active participation of societies was also important, but with the support from the government, the outcomes will be much better (Dione, BLH Pekalongan).

One official in Bappeda Pekalongan expressed similar views: "if the top leader has a strong commitment and clear direction, the line agencies will *sendiko dawuh* (follow the command)". The following is an explanation from an interviewee describing the Mayor's leadership style: "The Mayor ruled the city with an iron fist; just like Suharto. But it was good because if he was not like that the development program would not working" (Hendar, BLH Pekalongan Official).

In Temanggung and Tegal, adaptation had not been embraced. In these two regencies, adaptation was not an urgent priority. Development planning was simply to continue 'business as usual'. When asked about the national adaptation document (RAN-API), respondents from both regencies replied that they never heard about that and no dissemination of information about adaptation programs from a higher government level had been conducted. Nonetheless, they recognised the relevance of climate change in their local development paths. From talking with senior officers at an environmental agency in both regencies, several programs to mitigate environmental problems such as households' waste management had been initiated.

Interestingly, in both regencies Temanggung and Tegal, where adaptation issues were not a priority, the role of Regent was perceived as a critical determinant of such initiatives. A key staff member at the Environmental Agency in Temanggung, for example, recognised that if the Regent directed the line agencies to address these potential threats of climate change, they will follow such instructions. Another interviewee from the Environmental Agency in Tegal also supported this perception and presented similar views.

Hence, although adaptation to climate change had not yet been a central issue in both regencies, Temanggung and Tegal, this does not mean that the issue was not being considered at all. These officials wait for momentum for uptake to be instigated by elected officials. They understood the potential consequences of climate change but argued that if there were a direction from the head of the region, they would respond. This implies that there is little

effort from government employees to proactively propose adaptation activities to the Regent. This is not surprising given that the Indonesian bureaucratic culture is characterised by a strong top-down and hierarchical system (Irawanto, Ramsey, & Ryan, 2011).

Since the decentralisation and democratisation process is still not well established, strong and innovative leaders are important factors for the success of local development in Indonesia (Miller, 2013). Leaders could play a pivotal role in inducing adaptation and fostering collaboration among stakeholders across agencies. To summarise, there is a clear need for strong leadership relating to local adaptation policy. Elected officials are essential to lead this adaptation program so that it becomes a legitimate issue.

6.5.2 The Severity of Exposure

The importance of adaptation was also largely influenced by the degree of exposure and the magnitude of climatic impact (Smithers and Smit, 1997). The difference in ambition between fore-runners and slow adopters relates to people's experience of extreme weather events. In the regions with high levels of climate exposure, the demand for adaptation action has become a central topic in development planning. The experience of severe weatherrelated hazards has been highlighted in previous studies to relate to the willingness to develop adaptation strategies (Massey et al., 2014; Mickwitz et al., 2009). Experiences of damage due to climatic hazards have contributed to the belief that adaptation is needed. Conversely, living in disaster prone areas without the experience of adverse weather events can lead to a delay in adaptation (Lujala et al., 2015). In the case of climate hazards with the incidence of lives lost, the strong demand from the public is likely to increase and attract government attention. Conversely, a low level of vulnerability to climate change seems to be a causal factor for slow adoption of adaptation measures. The absence of citizen demand has discouraged local governments from initiating adaptation as one of the crucial issues.

Repeated damage due to climatic hazard events also encouraged local adaptation. In both cities, Semarang and Pekalongan, there was increasing suffering from the detrimental effects of climate change which were the main motivations for undertaking adaptation programs. In the case of Semarang, for example, the already observable and direct experience of climate hazards such as constant coastal flood, the recurrent riverine flood, landslide, dengue fever outbreaks, and drought were determining factors for adaptation efforts. In addition, in-migration by economic migrants caused environmental degradation as they were residing in disaster prone areas. The threat from climate change risks was also the driver for adaptation in Pekalongan. Inhabitants' experiences of tidal and riverine floods made adaptation a political issue. In Pekalongan, groundwater extraction due to agricultural activities had worsened coastal inundation in both frequency and the size of the flooded areas. Prior studies indicate that the increasing impact of climate change heightened demand for adaptation (Roberts, 2010). In such a situation, even without national impetus, adaptation was considered as a compelling need in both cities. One of the Pekalongan BLH officials commented: "Adaptation was a response to the observed impacts of climate change, how to survive and empower local communities who live in those hazard-prone areas" (Dione, BLH official). The perception of high risk from climate variability had triggered line agencies to work together to make adaptation a priority. In both cities, adaptation practices were essentially an effort to reduce vulnerability and to enhance adaptive capacity.

In the case of Temanggung and Tegal, adaptation was not an urgent priority. The adaptation was not explicitly stated in their development planning. Perception and experiences of low risk to climate impacts seem to influence the necessity to adapt although inland regions were also facing climate change consequences including clean water supply, land use change practices, soil fertility, and fires (Linkov & Bridges, 2011). So it can be argued that adaptation strategies were mainly driven by residents' experiences with repeated hazards. According to Massey et al. (2014), internal/endogenous forces are the main driver for adaptation. These two cities, Semarang and Pekalongan, clearly need to adapt due to the impact of climate change such as floods, landslides, inundations and droughts, while in the Temanggung and Tegal Regencies, they perceived a low risk of damage from climate change and had a limited commitment to adapt. This delay in starting adaptation may increase vulnerability or later costs. The field observations, interviews with local officials and focus group discussions with the communities in Temanggung, indicated no adaptation activities existed.

To sum up, experiencing frequent local calamities has been an important trigger for initiating adaptation. Thus, awareness-raising about the potential impact of climate change is firstly needed before adaptation activities are incorporated into ongoing development planning. Once public officers are conscious of the impacts of climate change, integration becomes a higher priority. At the time of my data collection, dissemination about NAPA was very limited. Interviews with Environmental Agency officers in Temanggung and Tegal, for example, revealed that they never received information or training about adaptation programs from the central or provincial governments.

6.5.3 Third Party Interventions

There is growing recognition that donors are a determinant of local adaptation policy in developing countries (Ireland, 2012). External assistance motivates local governments because they provide not only monetary aid, but also open access to information and technical expertise. Moreover, where the national impetus is weak, partnering with external actors is often required to cope with current and future hazards. Third party entities such as international development agencies, NGOs, associations of city governments, and universities (that have resources in terms of expertise, funds, and broader networks) are necessary to better understand the current vulnerability and the potential threat and to provide funds. Such collaborations can also help increase the legitimacy of local adaptation strategies (Wejs et al., 2014).

In the study areas, it was found that the presence of donors and NGOs had contributed to the undertaking of adaptation efforts in Semarang and Pekalongan while in Temanggung and Tegal, environmental external actors were simply non-existent.

There were similarities in how Semarang and Pekalongan's external partnerships supported local adaptation initiatives. For example, Semarang City received financial assistance from international organisations to implement some adaptation projects. Joint actions with local NGOs had been established, and the role of academics to provide capacitybuilding and skills upgrading for multiple stakeholders was also an important part of their local adaptation measures. Various adaptation projects such as Rain Water Harvesting, a Flood Early Warning System, and early warning of vector-borne diseases, had been implemented in Semarang City. In Semarang, the adaptation agenda created the opportunity of broader cooperation beyond national borders. International networks had been conducted with, for example, the Rockefeller foundation, URDI, and ICLEI. In 2009 the Semarang Mayor signed a MoU with the Rockefeller Foundation to initiate a local adaptation strategy to address sea level rise, floods, dengue fever outbreaks and landslides including mainstreaming adaptation programs into their medium-term development plan.

As explained earlier, Pekalongan's population exceeded 290,000 and its inhabitants mostly worked for small-scale industrial activities as casual labourers and informal traders. They were considered to be particularly vulnerable to climate hazards. Pekalongan City

recognised the urgency of taking necessary actions to reduce the harm from climate change. In Pekalongan, several international development organisations were involved in supporting some local adaptation programs. For example, JICA provided assistance for IPAL (instalasi pengolahan air limbah) - a domestic wastewater treatment plant - and UN-HABITAT provided technical and financial assistance for Pekalongan development strategies. One of key staff in the BLH noted: "We have worked with GIZ since 2009. They help us understand what the causes of climate change are, and how to adapt to new climatic conditions. Before they came, we did not know about these climate issues" (Dione, BLH Pekalongan official). Regarding the presence of international donor agencies in Pekalongan, one BAPEDA officer said: "I saw them help us altruistically" (Purnomo, Bapeda official). This section has demonstrated that with fewer resources municipalities with low levels of technical expertise and financial allocation rely more on external assistance including donors and early adopters. These observations are consistent with recent literature suggesting that third party assistance was effective in encouraging adaptation (Ireland, 2012; OECD, 2009). They contribute to implementing standalone pilot projects as well as providing training and mainstreaming adaptation initiatives into broader development policy.

In summary, in the absence of national governmental support, local authorities built networks with third party organisations to resolve issues of climate change. In this sense, donor agencies made significant contributions to encouraging local adaptation. These international actors may help with "jump starting mainstreaming" (Lasco et al., 2009, p. 144); providing financial assistance as a stimulant for policy uptake (Massey et al., 2014). However, it should be emphasised that these interventions are only possible through collaborative efforts with the local government. For example, after Semarang City made a clear commitment to adaptation (they adopted mainstreaming adaptation into their local budget or medium-term development planning), external support could be reduced to avoid dependency.

6.5.4 The Availability of Resources

The resources that enabled local governments to pursue adaptation projects led to a trade-off between coping with current impacts and adapting in the long-term (Brockhaus, Djoudi, & Locatelli, 2013). Local governments often excluded climate change impacts from development planning due to resource constraints or a lack of knowledge of such potential threats. Trade-offs between the local immediate interests and broader development goals
involve difficult choices. Local governments often suffer from financial, managerial, and technical limitations to induce adaptation. More pressing concerns such as education and health often demand immediate attention when compared with adaptation measures (Klein et al., 2005).

In Semarang, the problem of limited financial resources had been alleviated or resolved by a more sectoral approach to the most vulnerable people; these resources addressed flooding and drought. Although this approach allowed each sector to understand their roles more clearly, interaction and communication among different sectors become less intense. One respondent from the Municipal Environmental Agency in Semarang stated that since the sectoral activities begun, their communication with other adaptation players was less (than before) due to the tendency to focus on their own sectoral program. For example, he noted how his agency focused on a Rain Water Harvesting project while a health agency focused on a dengue disease outbreak early warning system.

In Pekalongan, the lack of resources had been solved through work with NGOs and donors. For example, one Bappeda official explained that GIZ was giving guidance in adaptation actions from the planning stage up until implementation stage on the ground. According to Hendar, an official in BLH, a lack of human resources was still a problem, particularly after central government imposed a moratorium on civil service recruitment. He noted: "We now have more additional tasks than our main job".

At the time of the interviews, Temanggung and Tegal Regencies had not commenced adaptation at all. This was in part due to competing priorities. The more immediate interest in health and education attracted more attention than long-term and uncertain anticipatory actions for adaptation.

There were clear differences between the availability of resources in cities and regencies in Indonesia. In cities, resources and facilities (economic infrastructure, transportation system, clean water provision, healthcare and school facilities) were more widespread. These different characteristics appear to bring different ways of adaptation.

6.6 Conclusion and Reflection

This chapter provided examples of mainstreaming climate change adaptation at the local level in order to understand the barriers and opportunities that influence local decision-

makers to engage with adaptation planning. Understanding the aspects that hinder or enable adaptation policies plays a fundamental role in the effectiveness of local climatic responses. As argued in Chapters Two and Five, the role of local authorities in adaptation to the climate change agenda is important and has been identified in numerous empirical studies (Klein, Mäntysalo, & Juhola, 2016; Wamsler & Brink, 2014). Given that the impacts of climate change will be manifested most directly at the local level, Næss et al. (2005) suggest that local-level needs should be a focus of investment to reduce current and future climate risks.

Indonesia is no exception to this growing body of knowledge that identifies the significant function of local-level administrative tiers in influencing the achievement of overall development goals including adaptation measures (BAPPENAS, 2012). It has become clear to the government that the local context is a central component in determining the success of its adaptation program. Through these four case studies, it has been demonstrated how adaptation policy is currently manifested in four municipalities in Indonesia (where the national impetus is weak for initiating adaptation). The Indonesian government has recognised that adaptation is an important component of climate change policy, and its implementation rests on line ministries and local governments. In this context, the full responsibility of adaptation actions rests on local government. The adaptation initiatives leave the local government to plan and budget their own adaptation development paths based on local conditions and needs. This can be understood from the decentralisation lens where local government is responsible for the provision of a wide range of services and public goods including health and education while the central government provides regulations and financial support. Since there is no explicit obligation and additional transfer of resource from the national government to support the implementation of adaptation, this policy has not yet received enough attention at the local level, particularly in municipalities which are considered less vulnerable to climate impacts. This finding is in line with research from Amundsen et al. (2010, p. 11) which suggest that "the lack of a clear defined role for municipalities in adaptation policies is a barrier for them in their work on this issue". The minimum involvement of central government leaves local governments to work without aid.

Based on the above review, there are two main typologies (similarities and differences) in framing adaptation approaches in the municipalities described above. The first is municipalities that consider adaptation as a crucial issue and conduct proactive-anticipatory responses. Semarang City and Pekalongan City can be categorised as this type. The second is municipalities that do not consider adaptation as a priority concern and therefore passively

react to climate hazards. In these municipalities, Temanggung Regency and Tegal Regency, the development planning is dominated by other more pressing issues such as health and education.

From these types, it was possible to identify the reasons why some municipalities are taking more initiative than others. Both internal and external factors determine the willingness to uptake adaptation policy and contribute to the difference in ambition to undertake local actions. Internal determinants are leadership capacity, the level of exposure of extreme weather incidents, and resources availability. Conversely, external factors include third parties support.

This chapter has shown that there are four primary drivers in mainstreaming adaptation: (1) forward-looking leadership, (2) climate variability and extreme weather events, (3) economic and human resource availability, and (4) interactions with non-state actors. The factors that contribute to the undertaking of local action are influenced by internal and external factors. Internal determinants are leadership capacity, the level of exposure to extreme weather events and resources availability while external factors include third party support (and progress in other countries). When the national impetus to address climate risks is weak and predominantly incremental, the local initiatives to adapt and to cope with climatic change are determined by the presence of strong leaders who provide clear direction regarding climate change action. As argued earlier, political leadership is pivotal at an early stage of adaptation and in the absence of mandates, regulations, clear job roles, and/or low public demand.

The other explanation for these differences is different characteristics of risk. As the potential climatic threats varied among municipalities, their responses also differed. Regions with a greater threat of harm were more pro-active responding to, and participating in, adaptation programs compared with less affected areas. It was also recognised that when the impact is more severe, the attention of the local government to such adaptation agenda is are likely to be higher. Lujala et al. (2015) argue that experiences of damage due to climatic hazards are an important trigger in adding adaptation to the political agenda (and living in disaster prone areas without an experience of climatic events which influences delaying adaptation). This is in line with the findings in this thesis.

The difference in responses between locations is also influenced by external impetus. External actors from international development organisations, NGOs and academia were identified as driving forces to accelerate the adaptation agenda. They provided support through their climate expertise, funds, and networks/international access. But intervention from these external actors is unlikely to happen in the municipalities considered less vulnerable.

Another critical aspect emerging from this thesis is the availability of local resources (i.e. human, financial, and institutional). These enabling conditions contributed to the willingness of the government to undertake adaptation planning. In the cities where more resources are usually available, they were able to develop more ambitious adaptation measures. The adaptation literature has recognised that larger cities usually have more resources to manage risks and hence more resilience to disaster (Cross, 2001).

Based on these findings, there are several potential ways to encourage other municipalities to uptake adaptation into development planning practices. First, a number of determinants contributed to the rise of adaptation projects, but there were four major factors that played a significant role. First, leadership played a major role in helping adaptation issues move forward. As the role of Mayors and Regents is significant, ensuring that they understand the impact of climate change in their areas in the future is needed first of all. With this knowledge, the process of adaptation may be easier to do. In the meantime, in supplying such information (a risks assessment study) mainly comes from NGOs and international development organisations. But in the future, this role could also be designed and prepared by the central and provincial governments.

Second, additional attempts to conduct local-risk assessments should be broadened to all regencies to improve knowledge on adaptation measures. At present, such vulnerability assessments are not available in every municipality. Indeed, the national government has provided some information regarding these potential hazards but it still has little detail (as described in Chapter Three). The absence of detail of vulnerability assessments makes it difficult for local development planners to determine effective adaptation programs. Additional support from a higher tier of government to provide such assessment may benefit local areas.

Third, links with external actors is an important support for adaptation uptake in Indonesia. Most of the municipalities that had mainstreamed adaptation received support from international donor agencies. External actors provided advice as well as funding to initiate some small adaptation projects particularly in the early phase of the adaptation process. This finding is consistent with findings of many other studies in developing countries that funding from international donors can encourage local adaptation (Anguelovski et al., 2014). The role of international entities and NGOs seems important for providing both knowledge and funding. Recent research on mainstreaming of adaptation in the 10 biggest cities in Columbia (Koch, 2016) has demonstrated the importance of multi-level governance frameworks in which national government and/or international funding may help the incorporation of adaptation considerations into a broader development agenda.

Due to limited time and budgets for intervention, some successful projects can then be continued by government line agencies or be replicated in other cities. Such replications, sharing best practice programs and extensions to other regions/municipalities, could help to spread success stories and would be beneficial for efficient adaptation.

Finally, providing appropriate resources among regencies seems to be crucial and becomes a continuing challenge. The economic development that tends to concentrate in the cities has attracted rapid urbanisation. Uneven development progress that has led to social inequality should be considered by all stakeholders. This finding is consistent with research reviewed in previous sections that larger cities usually have more resources to manage risk. For example, universities as a source of information and knowledge are usually located in the bigger cities in Indonesia. This can be seen as an opportunity for municipalities to have collaborations in conducting risk assessments and other activities that need universities' expertise. Respondents in Semarang and Pekalongan acknowledged the role of the university to design adaptation strategies.

The evidence presented here makes it clear that different municipalities have different perceptions, understandings, and approaches to adaptation policy, reflecting different degrees of urgency. As mainstreaming of adaptation needs a substantial time (the relatively long time) beyond the capacity of municipalities and 5-yearly power rotations, this chapter emphasises that the key four components discussed above are not sufficient to encourage municipalities to adopt mainstreaming of adaptation. Stronger government legislation and regulations, as well as incentives, are important to link the national with the local level. The current national adaptation frameworks have not reached the wider public's attention. For anticipatory planning and measures, a voluntary mainstreaming undertaking is not sufficient to address the long-term vulnerability of local areas. For example, across all four municipalities, mitigation had been part of their development plan. This was related to the mandatory and

binding demand from the national authority. Therefore, climate actions were dominated by mitigation rather than adaptation. Compared with mitigation, adaptation had less support from the national government. So far, adaptation has been overshadowed by mitigation.

In general, adaptation and development strategies in Indonesia's municipalities remain top-down. These may be a consequence of the long experience of excessive control under Suharto's New Order. Two lessons may be learned from this climate change adaptation in Indonesia's municipalities. The first lesson concerns the role of local leaders in encouraging and coordinating adaptation initiatives forward. This endogenous factor is crucial at the early stage of adaptation. Another lesson regards to the willingness of local government staff to work with the external actors. This exogenous factor is particularly needed at the later stage of adaptation actions. Based on these mitigation experiences, this thesis concludes that the current adaptation policy framework could not provide plausible legitimacy for mainstreaming. Clear obligations and mandates are required to deal with adaptation and to actively respond to climate-related hazards.

Chapter Seven: Local Government Efforts in Adaptation to Climate Change: the Case of Semarang

7.1 Introduction

A wide range of studies suggest that local governments have a fundamental role in adaptation efforts (Grothmann & Patt, 2005; Keskitalo, 2010; Walker et al., 2014; Wamsler, Luederitz, & Brink, 2014), resulting in a growing recognition of the need for research on local capacities and some potential barriers they encounter to adapt effectively (Bulkeley & Betsill, 2005; Rakibul, 2014). In addition, while attention on climate adaptation is growing, there are few empirical studies on the barriers and successful strategies relating to this topic (Antwi-Agyei et al., 2014; Burch, 2010; Pasquini et al., 2013). This chapter adds to the literature by providing empirical evidence of adaptation actions and examining the efforts of Semarang City to overcome barriers to adapt to climatic change. Taking Semarang City as a case study, this chapter investigates the factors underpinning mainstreaming adaptation; and how city officials try to overcome these barriers and in doing so transform local engagement. In addition, empirical studies focusing on adaptation to climate change in middle-income countries is scarce (Berrang-Ford et al., 2011; Ford et al., 2015; Nath & Behera, 2011). Thus, this chapter contributes to this under-represented field of research.

Firstly this chapter summarises the roles and responsibility of local government in Indonesia. Following a section providing a description of Semarang City and the case study area, I turn to the results of my case study. This is divided into three sections: the driver of addressing climate change, the challenge of adapting to climate change, and strategies to overcome obstacles.

Semarang City was chosen as the field site for the case study for two reasons. First, Semarang is among the 'early adaptor' cities in Indonesia that are incorporating adaptation into their development agenda. This city has been selected as part of the Asian Cities Climate Change Resilience Network (ACCCRN) programmes together with several other cities in India, Vietnam, and Thailand. It was also selected as a national pilot site by Bappenas (National Development Ministry). Semarang's responses to climate-related hazards have the potential to provide lessons for other medium-sized cities to handle their climate and development pressures.

Second, it has experienced extreme events such as tidal flooding, drought, storms, and land subsidence that are likely to worsen due to climate change. As in many other cities in developing world, Semarang has also faced other pressing issues such as infrastructure provision, poverty alleviation, and a basic service deficit. Semarang serves as a good example of how city government finds the best way to address both vulnerability problems (short-term goals) and long-term development goals (adaptability to climate change).

7.2 Background

7.2.1 Governmental Administration in Indonesia

As explained in Chapter Three, Indonesia is a unitary state with a hierarchical administrative structure comprised of three tiers: national, provincial, and local government. At the local level, there are two different forms of governmental administration: Kota (urban municipal or city) led by Walikota and Kabupaten (rural districts) headed by Bupati. Since the introduction of a decentralization policy in 1999, the major authorities have been devolved to local governments (rather than to provincial governments). The provincial government does not have the authority over local government. Their role is as a representative of the national government in the regions, and they work mainly in coordinating functions in case there are cross-boundary development issues that are beyond the authority of local government (Diprose, 2009). As set out in Law 22/1999, local government is responsible for the provision of a wide range of services including public works, health, education and culture, agriculture, transportation, industry and trade, investment, environment, communication, land affairs, cooperatives, manpower, and infrastructure. The national government has the authority for defence and security affairs, justice, foreign policy, monetary/fiscal matters, religion, forestry, and currency.

As a consequence of this devolving authority, there are increasing fiscal transfers from national to local government. According to Blöndal et al. (2009), local governments are faced with limited fiscal revenues thereby they are highly dependent on transfers from the national government; around 90%. These fiscal transfers comprise three elements: first, a general purpose allocation fund (Dana Alokasi Umum, DAU). This equalisation grant is aimed at balancing financial capacity across districts and cities. Second, there is a special purpose allocation fund (Dana Alokasi Khusus, DAK). This is earmarked for grants (e.g., natural disasters and other emergencies) and for financing national government priorities at the local level. The third is revenue sharing (shared tax revenues and natural resource revenues such as oil, gas, forestry and mining) (Schulze & Suharnoko, 2014). Since there are no additional transfers from the national government to support the implementation of adaptation, the national government recommends mainstream adaptation into the existing development planning to access funding from private sectors through a loan or Corporate Social Responsibility (CSR), or through the attainment of a grant from international funding sources (BAPPENAS, 2012).

7.3 Location and Topography

Semarang, the fifth largest city in Indonesia with more than 1.5 million inhabitants (in 2014) spans about 374 square kilometres (Figure 9). The average population is about 4,172 people per square kilometre with an annual population growth of 0.97% in 2014 (BPS, 2016). The city has an unemployment rate around 7.76%; higher than the Central Java Province average of 5.86% (Semarang City Government, 2016) with 4.90% of people living below the poverty line in 2014 (BPS, 2016).





Source: (Mulyana et al., 2013)

The climate is tropical and characterised by high temperatures and humidity throughout the year. Semarang has two seasons: the rainy season extends from December to May and the dry season is from June to November. The average monthly rainfall in the rainy season is between 1500 to 3000 mm (CCROM-IPB, 2010).

As the capital city of the Province of Central Java, it is the main business and industrial hub and is a magnet for migrant workers from the surrounding areas and also from other islands. Growing urbanisation, in turn, increases environmental risks (Mulyana et al., 2013; Taylor, 2011) because new settlements are highly exposed to natural hazards (Mechler, 2005) or informal slum areas due to population growth outstripping infrastructure development (Opitz-Stapleton, Seraydarian, Macclune, Guibert, Reed, 2009)

The coastal lowland in the north of Semarang has a flat topography and supports a dense population (Handayani & Rudiarto, 2014). This area serves as a hub for government activities, a business centre, and is the location of transportation services like a harbour, airport and railway stations (Abidin, Andreas, Gumilar, Sidiq, & Fukuda, 2013). The majority of people's dwellings are estimated to be less than 10 metres above the average sea level (Marfai & King, 2008). They already suffer from coastal flooding as well as land subsidence; these have already caused infrastructure damage (Marfai et al., 2008). Meanwhile, storms and landslides are major risks in the hilly terrain in the southern part of the city (Opitz-Stapleton et al., 2009).

7.4 Impact of Climate Change

Semarang has been identified as being vulnerable to the severe consequences of climate change (Harwitasari & van Ast, 2011; UNFPA, 2013). These risks include coastal flooding caused by a combination of sea level rise and land subsidence, flooding from intense rainfall, and drought due to lengthening dry seasons with decreasing precipitation (Opitz-Stapleton et al., 2009).

7.4.1 Sea Level Rise

Although there is no comprehensive data to understand climate variability and change in Semarang, CCROM-IPB (2010), in their study on the vulnerability of the city to climate change, found that over the past 100 years there is an increasing level of mean surface temperature (see Figure 10). This projection suggests that changing temperature trends are likely to lead to rising sea levels and the occurrence of both tidal and monsoon floods.



Figure 10: Average Temperature Trend in Semarang City

The sea water level is predicted to rise about 15.5 cm in 2030 and will further increase to 77.5 cm in 2110 (Semarang City Government, 2016). Other research estimates that the water along the coast will increase between 40 cm to 80 cm over 100 years (Mulyana et al., 2013). Sea level rise brings additional risks ranging from coastal inundation and coastal erosion, mangrove degradation, to health problems (such as vector-borne diseases) (Marfai et al., 2008). As a large part of the city is located in low-elevation coastal zones (LECS) (areas with an elevation less than 10 metres above the mean sea level) (Mulyana et al., 2013), tidal flooding occurs regularly or even almost every day depending on the tidal oscillation (Marfai & King, 2008). A tidal flood was first recorded in 1957 (Semarang City Government, 2016). Recent research found that the water height is between 40 to 60 cm and reaches over 2 km inland (Marfai et al., 2008). It is estimated that there are approximately 840,000 people with a population density of 10,201/km2 living within the LECZ (Mulyana et al., 2013).

In addition, there are 20 villages with 148,000 people vulnerable from these tidal floods (Marfai & King, 2008). Another projection indicates that the population threatened by tidal floods is between 31,000 to 114,000 people if sea level rises between 0.25 metre to 1 metre. If sea level increases between 2.28 and 3.03 m (due to the combination of high tide and sea level rise), the affected residents will increase between 177,000 to 443,000 (Boer et

Source: CCROM-IPB (2010)

al., 2010). The report further estimates that sea level rises can also lead to economic loss. If the sea level increases by 0.25 metre, economic losses of about 1.5 billion USD will occur, and the loss will increase exponentially by 378 billion USD if the sea level rises combined with land subsidence reach 1 metre (Boer et al., 2010).

7.4.2 Drought and Flood

A recent study by UNFPA (2013) concludes that there is a change in climate pattern/trends in Semarang. The air temperature has increased over the past 100 years, and at the same time there is more intense rainfall during the rainy seasons and less rainy days during the dry season. This condition has contributed to more frequent drought. This report points to three identified risks. First is the lack of clean water provision. CCROM-IPB (2010) indicates that the highest level of water shortage usually occurs between July and August (see Figure 11).



Figure 11: Times of Water Shortage

Source: CCROM-IPB (2010)

As the city water company (Perusahaan Daerah Air Minum-PDAM) can only service around 35% of the population needs (CCROM-IPB, 2010), the rest must rely on other sources such as extracting underground water (by building pumped wells), purchasing from private providers, and collecting from water springs (Hadipuro & Indriyanti, 2009; Taylor, 2011). These excessive groundwater extractions by both communities and industries have led to the permanent reduction of groundwater levels that in turn contributed to land subsidence (Marfai & King, 2008). Secondly, increasing temperature and high humidity encourages mosquitoes to breed, thereby increasing cases of dengue hemorrhagic fever (Wirawan, 2010). For example, in 2015, Semarang was recorded as having the third highest infection rate in Indonesia (Semarang City Government, 2016). Poor housing conditions with no clean water supply from the municipal tap water company have also been identified as a source of other health problems such as typhoid fever (Gasem, Dolmans, Keuter, & Djokomoeljanto, 2001).

Thirdly, drought has caused losses in the agriculture and fisheries sectors. According to the CCROM-IPB (2010) report, the price has increased for some agricultural commodities such as rice, crops, and fish during the drought with the average increase is around 36.75%.

In addition, more intense rainfall increases the risk of riverine flooding. With 21 rivers flowing through the city, Semarang is vulnerable to severe flooding (Semarang City Government, 2016). Monsoon flooding is not a new phenomenon in Semarang. For example, historical records show that flood was first reported in 1910 (van Roosmalen, 2014). Recent studies (Harwitasari & van Ast, 2011; Rahardjo, 2000; Sugiri, Buchori, & Soetomo, 2011; Sutanta, Rajabifard, & Bishop, 2013) point out that floods stem from the combination of a poor drainage system, upstream environmental degradation, heavy siltation in the downstream sections, and high precipitation. Floods bring a variety of impacts on the city's residents and their livelihood including health, transportation, agriculture loss, and infrastructure damages (CCROM-IPB, 2010).

7.4.3 Land Subsidence and Landslide

As discussed previously, excessive groundwater extraction has contributed to subsidence in the City. According to Chaussard, Amelung, Abidin, and Hong (2013), heavy groundwater extraction for industrial needs has caused rapid land subsidence in several Indonesian cities including Semarang. Semarang has experienced high rates of subsidence; up to 19 cm annually between 1999 and 2011 at several locations along the coastal areas (Abidin et al., 2013). Moreover, there has been an upward trend in the severity of subsidence; for example, it was reported that subsidence has caused sinking land of 362 ha (2010) and 1,377 ha (2015) and it is estimated to increase up to 2,227 ha by the year 2020 (Marfai & King, 2008). Among the causes identified of this subsidence is the natural consolidation of young alluvium soil, excessive groundwater use, and over development (building and constructions) (Abidin et al., 2013).

This situation poses some serious problems including the expansion of tidal flooding, the increase of property damage, deeper saltwater intrusion inland, and also disturbing people's livelihoods in terms of health and sanitation issues (Abidin et al., 2013). Almost 72,000 people in six villages suffered from land subsidence (Marfai & King, 2008).

As noted earlier, there is an increasing trend in monthly precipitation during the rainy season. Increasing precipitation also has adverse impacts on erosion, land movement and landslides, particularly in the upper areas and hilly regions in the South. Landslides have caused severe damage to infrastructure, houses, and other properties (Taylor, 2011).

7.5 Adaptation Actions in Semarang City

Like many other coastal cities around the globe, Semarang faces a double-edged sword. While attracting a large number of people for economic and lifestyle reasons, population growth in coastal cities may lead to escalating human and economic loss due to greater exposure to hazards. Without adequate urban planning, substantial population growth, together with increased risk from climate-related hazards, tends to escalate losses (Rivera & Wamsler, 2014).

To lessen such consequences, the city's government and the Asian Cities Climate Change Resilience Network (ACCCRN), funded by the Rockefeller Foundation began an adaptation program in Semarang in 2009 to increase Semarang's resilience to climate risks (Archer et al., 2014; Brown, Dayal, & Del Rio, 2012; Moench, 2014; Tyler & Moench, 2012) through mainstreaming adaptation into development policies (Archer et al., 2014). Table 9 summarises adaptation actions that have been conducted by the Semarang city government in cooperation with ACCCRN.

Adaptation Activity	Description	Beneficiaries
Pre-feasibility Study for Expanding	As climate change is predicted to exacerbate the city's water, finding	Currently around 44% of the population are not

Table 9: Description of Adaptation Actions

Rainwater Harvesting Systems	inexpensive technologies to address this water scarcity is crucial. The objective of this a pre-feasibility study is to explore the potential of rainwater harvesting system in reducing climate change vulnerability, particularly flood and drought, enabling the city to cope with the water scarcity problem	served by the city's water company. The rainwater- harvesting technology will help to address the water scarcity by providing clean water without exploiting surface and groundwater resources
Flood Forecasting and Warning System (FEWS)	The development of a flood early warning system will improve the ability of people to prepare for the risk of flood. Providing flood forecast information will enhance the adaptive capacity of communities (evacuation strategy to reduce damages and loss) This initiative will benefit vulnerable groups affected by flooding such as residents residing in coastat areas and along the riverbanks	
Actions Changing the Incidence of Vector- Borne Endemic Diseases (ACTIVED)	The immediate impact of drought and flooding is the limited access to clean water. This condition has contributed to an increasing risk of vector-borne diseases and expanding mosquito breeding grounds. Strengthen the HIS (Health Information System) and development of a Health Early Warning System (HEWS) will improve the ability of stakeholders (communities and relevant government agencies) to respond both before and after infectious disease outbreaks	The beneficiaries are approximately 13,860 households in the 6 sub- districts. Other beneficiaries include 30 elementary schools, 24 hospitals, and 8 local health centres
EnhancingCoastalCommunityResiliencethroughStrengthenedMangrove EcosystemandServicesandAlternativeLivelihoods	Since the 1990s, large areas of mangrove forest have been converted into fishpond. Due to pollution, salt water intrusion and warmer seawater temperatures, the productivity of this aquaculture industry is decreasing. The restoration of mangrove ecosystems will provide natural coastal buffers, protecting	The beneficiaries of this project include: 80 coastal community groups consisting of fishermen, fishpond farmers and fishery-related industries, Other beneficiaries who will receive a training

with additional economic income, for NGOs s	staff, and private
example through eco-tourism sectors	

7.6 Result and Discussion

The results from key informant interviews, observations, and archival analyses are presented in the following sections. First, I present the driver to actions and the key climate adaptation strategies conducted by the city government. Second, I identify the main barriers to mainstream adaptation. Third, I discuss the strategies to address such challenges. Finally, I highlight the policy implications for climate change adaptations for other cities.

7.6.1 Drivers to Mainstreaming

A large number of respondents mentioned four issues that contribute to the mainstreaming uptake in Semarang. The most prevalent was the experience of extreme calamities coupled with a high cost of inaction, followed by support from foreign funding organisations, and the existence and active support of non-government actors such as NGOs and universities. Past extreme disasters appeared to foster general awareness that action was necessary. These frequent experiences of severe weather events, and the consequent monetary loss, were most frequently mentioned as the most important driver to implement adaptation in Semarang. Interviewees reported that landslides, tidal waves, drought, and flood events were a major threat; endangering people's lives.

Within the adaptation policy literature, the experiencing of extreme and frequent local calamities have been reported as an important trigger for initiating adaptation (Anguelovski et al., 2014; Biesbroek, Klostermann, Termeer, & Kabat, 2011; Mickwitz et al., 2009). Another factor that contributes to increasing this awareness could come from spreading information through many publications (from scholars) (Anguelovski et al., 2014). Respondents in Semarang asserted that concern about the current climate hazard, and its potential in the future, has been recognised as a main motivating factor for adaptation (Interviewees LS1, LS2, LS3).

The city government has conducted several adaptation actions, either in cooperation with donors, or using their own budget. These strategies include physical, non-structural (cognitive), and regulatory aspects. Structural infrastructures include building polder systems, dikes, and pump stations. Non-structural measures involve strengthening disastermanagement capabilities, public education, capacity-building for government staff, and regular training programs for relevant stakeholders. An example of a regulatory instrument is integrating resilience planning strategies into long-term city planning.

Small-scale pilot projects have also been conducted in several areas. These include community-based coastal erosion adaptation in Tapak Tugurejo (by Bintari NGO), community-based revolving funds for housing renovation and sanitation due to land subsidence and tidal flood in Kemijen (by Perdikan NGO), building community-based early warning systems including a disaster preparedness committee to adapt to a landslide and cyclone in Tandang (by Centre of Planning and Public Participation/Diponegoro University), and adaptation to drought and landslides by developing bio-pores (water absorbing holes) and catchment wells in Sukorejo (by State University of Semarang) (CCROM-IPB, 2010).

7.6.2 Challenges to Mainstreaming

Less progress to adaptation can be caused by several sources. There are seven factors frequently mentioned as the main barriers to mainstream adaptation in Semarang (see Table 10).

Barriers	Strategy for Overcoming Barriers
Knowledge gaps/insufficient	Partnership with donors, universities, NGOs, conducting
knowledge	FGD and training, dissemination of information,
	developed information system accessible to the public
Lack of political support	Rely on local heroes, regular information feeding,
	participation in transnational networks (100 Resilient
	city)
Lack of financial resources and	Rely on international supports, incorporate into existing
incentives	development planning
The absence of regulation and	Innovation, learning by doing, rely on international
guidance	supports
Lack of institutional memory	Shadow team, publication and documentation,
Lack of coordination	Informal communication, establishing of Climate
	Working Group
Divorce of planning from	Lobbying, technical assistance and evaluation
implementation	

7.6.2.1 Knowledge Gaps

An obvious and major barrier that emerged when the city's government began adaptation initiatives in 2009 was the limited understanding of the term and its program. Even if this knowledge existed, there was no information how to use it effectively (Sutarto and Jarvie, 2012). One respondent who worked for Bappeda acknowledged that at first it was very hard to convince line agencies to mainstream (incorporate) adaptation into their daily routine activities (Interviewee LS1). This was largely due to frequent calamities such as inundation being perceived as a common consequence of living in a coastal area. He further added, "I therefore need help from consultants [people who work for international development agencies] to increase awareness, convince, and help to integrate line agencies to incorporate adaptation" (Interviewee LS1). He said that compared with NGOs and universities, convincing relevant departments that climate change has worsened is very hard. It is unsurprising since adaptation is a new issue for the majority of local officials compared with, for instance, mitigation projects with which they are more familiar. He considered increasing knowledge about adaptation for bureaucrats to be the most crucial step. In addition, mainstreaming adaptation presents new challenges and increases the workload of government officials.

To address knowledge gaps, the Semarang City government worked closely with third parties such as international aid agencies, NGOs and universities providing basic knowledge and information in order to increase awareness among government workers. Many studies show that insufficient knowledge of climate change issues is a primary obstacle for adaptation (Bulkeley & Betsill, 2005; Firman, Surbakti, Idroes, & Simarmata, 2011; Juhola, 2010; Lasco et al., 2009). To address knowledge gaps, the City's Bapeda initiated a sharing knowledge forum called Shared Learning Dialogue (SLD) (Reed et al., 2011). SLD was intended to facilitate sharing experiences and knowledge between all stakeholders and providing updates on the progress of the many adaptation projects in Semarang City. For example, through this forum they were involved in flood prevention projects and they could share their experiences with other stakeholders from different projects (health, mangrove restoration, and Rain Water Harvesting). Thus, there was communication across sectors such as NGOs representatives informing government officials about their activities and vice versa (Interviewee LS5).

7.6.2.2 Lack of Political Support

Another important point reported by interviewees as a barrier was the lack of consistency to the adaptation agenda particularly after rotation of power (Interviewees LS1, LS2, LS4). For example, it was widely known that the Mayor of Semarang was detained by the Corruption Eradication Commission (Komisi Pemberantasan Korupsi-KPK) for bribery in the budget preparation process in the middle of his term (The Jakarta Post, 31 March 2012); as a result, his Vice Mayor temporarily held the position of Mayor. Unfortunately, under this new (acting) Mayor, adaptation (and other development programs) did not work smoothly. According to some interviewees, this was because of his lack of leadership power and individual capacities, which led to reluctance to make decisions to steer policy implementation. Due to this power handover, one government stakeholder felt that he had to adapt to this new leadership style (passive and lack of policy innovation) and priorities (focused on the more immediate priorities such as education than environmental and climate change issues) (Interviewee LS2).

7.6.2.3 Lack of Financial Resources and Incentives

Although it was stated only briefly, financial resources emerged as an important barrier for adaptation. Respondents generally referred to the absence of financial incentives from the central government to be devoted to adaptation projects in local authority levels. Current financial transfers provided by central government are mainly for 'routine expenditure' such as the salary of government officials and office needs. A focus on routine expenditure implies that limited funding for development (education, health, and housing) results in the marginalisation of adaptation (MoE, 2012). Weak incentives from the higher levels of authority can serve as a barrier for adaptation at the local scale (Keskitalo, 2010). The endorsement from the national level to accelerate adaptability is unlikely to work if there are no additional incentives and resources such as funding and manpower (Anguelovski & Carmin, 2011). Nevertheless, the central government has provided the opportunity for local governments to develop partnerships with international development agencies and the private sector for adaptation funding (BAPPENAS, 2012).

This thesis revealed that despite an increasing awareness of adaptation concerns among decision-makers, attempts at mainstreaming were still at a very early stage. In Semarang, the local government did not allocate specific funds from the budget for adaptation. It was said that in the initial step of adaptation, local government tried to earmark spending for adaptation, but this approach was perceived to be ineffective because each sector seems work in isolation (caused by the difficulties in coordination) (Interviewee LS1). As a consequence, financial matters were not perceived as the main problem by the majority of respondents and this issue was rarely mentioned during interviews. In addition, the role of private sectors in adaptation has not been optimally developed. According to one interviewee working for a local environmental agency, private businesses are only interested in engaging in activities with wider community involvement and large media coverage such as mangrove plantations. This finding reinforces the results of earlier studies which demonstrate that to varying degrees, the engagement of businesses in environmental issues may be motivated by short-term profit orientation (Steurer, 2011). Besides that, private sectors generally perceive that environment-related investment generates only small profits (Barnett, Waters, Pendergast, & Puleston, 2013).

7.6.2.4. The Absence of Regulation and Guidance

A study by Solecki, Leichenko and O'Brien (2011) found that local government development planning was influenced by both the national policy agenda and international NGOs. The majority of respondents (Interviewees LS1, LS2, LS3, LS4, LS11) perceived that the lack of direction and guidance from higher authorities at the national or provincial level was a challenge for the mainstreaming of adaptation initiatives. The existence of national guidance was cited as an enabling factor for sub-national authorities to begin to pay attention to the adaptation issues. For example, an interviewee working for a donor agency with a great deal of experience with mitigation activities reported how it was difficult to convince some local governments to adopt or initiate mitigation programs, but immediately after the central government released the Presidential Instruction on the National Action Plan on Reducing Greenhouse Gas Emissions (RAN-GRK), numerous local government officials asked for help to formulate local programs (Interviewee LS3). He further added the difficulties involved to convince the Central Java provincial development planning agency (Bappeda Central Java) to adopt mainstreaming in the absence of direction and mandate from the central government authority. When asked why the provincial government did not engage in adaptation actions, an interviewee from Bapeda Central Java Province argued that basically adaptation was similar to development so stand-alone adaptation was not an issue of concern (Interviewee LS 10). Another university-based respondent commented that when dealing with local government, clear obligations and mandates were important, and that actions that were voluntary would never work (Interviewee LS6). A Semarang-based respondent working for a donor agency summed up that "scary" regulations were necessary (Interviewee LS5) and this was particularly true for local governments with a weak Mayor/Regent leadership capacity (Interviewee LS3).

As mentioned above, the provincial government has a strategic role in facilitating vertical coordination between sub provincial (cities and districts) and the national level. When asked why officials at the provincial level had not yet engaged in adaptation activities, an interviewee who worked for the provincial government further commented that there was no obligation to develop an adaptation plan separately from the broader development agenda (Interviewee LS3). According to key interviewees, less attention from the Central Java provincial government was caused by a combination of: a) a wait-and-see strategy (waiting for national guidance), b) a strong focus on mitigation measures, c) large workloads, d) low awareness (in particular the absence of vulnerability assessments), and e) the fact that many senior officials who are responsible for climate change related issues had retired and thus disrupted routine activities.

Indeed, with the problem of fragmented inter-territorial jurisdiction, the role of the provincial level is vital. The provincial government can initiate a cross-border adaptation framework but, unfortunately, provincial actors are perceived as paying little attention to adaptation concerns. It was recognised that it is impossible for the city of Semarang to undertake adaptation without the involvement of other authorities; particularly in surrounding areas. To help improve this problematic gap, Semarang City became an informal coordinator between Semarang and surrounding regions as long as there was a clear mandate and role of international organisations (Interviewee LS1).

Thus far, the involvement of the Interior Ministry in the adaptation agenda is limited and at times missing. For the adaptation agenda to be more effective, the Interior Ministry needs to generate commitment for adaptation actions in elected and appointed officials. One of the interviewees emphasised that relevant agencies in local levels will pay attention to the policy direction from the Interior Ministry, especially for administrative matters. A respondent from the Environmental Protection Agency recognised that the Interior Ministry has stronger powers to push local governments to mainstream adaptation compared with, for example, the Ministry of Environment. To address vertical coordination problems, and to streamline national and local governmental policies, the role of the Interior Ministry is considered significant.

Besides that, at the time of the interviews, there was no uniform method for vulnerability assessment from the National Government. There were inadequate methods and standards to assess and address vulnerability, which in turn led to various approaches in different areas in designing adaptation options. One key informant from the City Environmental Protection Agency expressed that the consequences of the absence of national guidance was that local governments try to overcome their existing challenges by themselves (Interviewee LS2). He cited the example of how to cope with coastal erosion; in this regard, local governments undertook different approaches. Pekalongan City adopted a system from Germany while Demak District adopted one from the Netherlands. Some scholars argue that the national level's role is to provide regulations and guidance and that this is crucial (Aall et al., 2012; Anguelovski & Carmin, 2011; Jordan & lenschow, 2009). A respondent from APEKSI (a city government association) said that national regulations are crucial given that to allocate the budget for adaptation-related activities, local governments need justification (Interviewee LS 15). Without a clear legal framework from the national level, it is unlikely that local decision-makers will allocate additional funds for adaptation. As a consequence of the limited funds, stand-alone adaptation projects are not recommended.

7.6.2.5 Lack of Institutional Memory

Retaining staff with sufficient skill and expertise is another challenge. The lack of institutional memory was raised by a large number of respondents as a crucial impediment. Respondents noted that job rotations that occurred within short time intervals (between 3 to 5 years) as a key challenge for the sustainability of the adaptation projects. The pattern and criteria of this rotation were unclear from the interviews. The Environmental Protection Agency interviewee believed that it was not based on individual (good) performance but that it might involve political reasons: "some of them who have good performances do not receive a career promotion" (Interviewee LS2).

An interviewee from a donor agency with experience working collaboratively with government officials complained about the difficulties in starting from scratch if staff with technical expertise were moved (Interviewee LS5). A similar story was reported in Bandar Lampung, another site of ACCCRN projects, where personnel rotation without adequate preparation had a significant consequence on the continuation of an ongoing adaptation project (Lassa & Nugraha, 2014).

In the adaptation literature, a high number of studies have reported on the adverse effect of frequently changing personnel. There is widespread consensus that rotating public employees may sacrifice institutional memory (the loss of past experience), hinder coordination and networking (Ahsan & Panday, 2013), disrupt the continuity of long-term programs (Lehmann, Brenck, Gebhardt, Schaller, & Süßbauer, 2015), lead to 'loss of trust' (Termeer, van Buuren, Knieling, & Gottschick, 2015), or project postponement (Sutarto, 2012). This causes a disruption of knowledge accumulation and preservation (Ayers, Huq, Faisal, & Hussain, 2014), and leads to an overreliance on outside parties or NGOs as sources of information and expertise (Lehmann et al., 2015).

To overcome this challenge, members of the city team instigated an initiative to establish a shadow organisation called IUCCE (Initiative for Urban Climate Change Environment). This new organisation was not a governmental unit although the majority of its members were from the city team which included public servants from related agencies. The main aim of IUCCE was as a discussion forum among active city team members and former senior employees (core members who had moved to other units) to maintain the continuity of adaptation in Semarang after the ACCCRN project terminated in 2015.

7.6.2.6 Lack of Coordination

Communication and coordination among various agencies was another barrier noted by interviewees. Respondents stated that formal inter-agency coordination was difficult (Interviewees LS1, LS2, LS4). It appears that the interaction between local policy communities is at times not cordial. One interviewee provided an example of how coordination was challenging by saying that inter-unit coordination within the Bappeda Semarang City office itself was not easy; let alone between different agencies (Interviewee LS6). Limited vertical communication (between Semarang city, the Province of Central Java, and the National Government) was also an issue raised by respondents. A key interview participant stated: "The higher authorities tend to underestimate us (the level of knowledge and capacities of local actors) in undertaking adaptation strategies" (Interviewee LS1). Even though their office is located in the same city, an interaction between the provincial and city level was inadequate. One interviewee commented how provincial representatives seemed surprised (during a workshop held by the provincial level) to know that the Semarang city already had a vulnerability assessment (Interviewee LS1) and had initiated an adaptation policy plan. The weak coordination, not only on climate change issue but also almost all policy fields, has significant consequences for the effectiveness of overall adaptation

programming (Interviewee LS4). However, the respondent believed that strong leadership from the Mayor may facilitate collaborative work between organisations (Interviewees LS1, LS2, LS4, LS6).

In such a situation, and for effective interaction, informal communication was reported as a way to influence the line agencies to be more engaged in adaptation processes. Literature has documented that "informal communication takes place when issues are novel, new, or innovative, and there is no precedent which may allow an organization to develop a routine to handle this issue" (Ahsan & Panday, 2013, p. 591). A key interview participant from Bappeda said "If I talk formally to the head of agencies they just say yes [but take no further action], but it is a different [better result] in spontaneous and less formal meetings". Another example of this approach was to raise the adaptation concerns/issues (mainly by administrative heroes working for Bappeda which shared the building with the Mayor's office) on any occasions especially when there were any inter-agencies meeting in the city hall. According to a key respondent, this kind of communication was a better way to share information about the current program and more importantly to encourage these line agencies to start considering climate responses to their routine operations (Interviewee LS1). Fortunately, many of the government officials responsible for adaptation related issues (and an NGO activist as well as academic/researchers in the City Team working group) graduated from the same university and the same department (Urban Planning of Diponegoro University) so basically they were already familiar with each other.

7.6.2.7 Inconsistencies between Planning and Implementation

A strong criticism was expressed by several key respondents with regard to the inconsistency of land use planning and adaptation strategies, resulting in confusion and extreme pessimism. A notable example of the intense conflict between city team members (government officials, universities, and NGOs) and local communities on the one hand and local (political) elected officials on the other hand involved the relocation of allocated land planned for eco-tourism (a mangrove education centre). Instead of the eco-tourism development, the money was instead used for business purposes. This happened because there was an approval from the (new) elected Governor and (new) Mayor for these business activities, while the Environmental Protection Agencies had allocated significant sums for this project. There is currently no clear mechanism how to overcome such infighting and disagreement. The adaptation literature has recognised that institutional barriers in terms of "short-termism of politics" represent a major challenge in adaptation work (Mees, Driessen,

& Runhaar, 2012, p. 311). A study conducted in Southeast Queensland also found that a lack of political support hindered adaptation measures as decision-makers preferred short-term priority actions (Baker et al., 2012).

7.7 Explaining Strategies to Overcome Obstacles

The result from interviews shows multiple mechanisms that could be used to overcome the aforementioned constraints. Respondents identified five strategies for addressing barriers to mainstreaming adaptation that I address separately in the following sections. I also discuss the preferred strategies for different sectors and the reasons for the different levels of support for different strategies. Finally, I address the extent to which these locally identified strategies cohere with the literature on mainstreaming adaptation.

7.7.1 Mayoral Leadership

The most widely mentioned factor was the key role of Mayors and the extent of their commitment to adaptation programs. The majority of interviewees commented that the mayoral leadership plays a key role in encouraging such initiatives among line agencies. This was, according to informants, closely related to patriarchal values in societies. Government stakeholders, for example, spoke about the "patrimonial" (bapakisme in Indonesian expression) and hierarchical structure of the organisational system, meaning "the interaction between superiors and subordinates, by which a superior is positioned as a father and reliable patron who should be honoured and followed" (Wihantoro, Lowe, Cooper, & Manochin, 2015, p. 5). This relates to Javanese culture, influenced by the Indian caste system, characterised by strong hierarchical, patriarchal relationships and inclusiveness (Pruetipibultham, 2012; Robertson-Snape, 1999).

In Indonesia and Java, in particular, patriarchal and hierarchical relationships are a dominant norm that may undermine participation (Widianingsih & Morrell, 2007). A senior bureaucrat working for Bappeda illustrates this point: "one word from the Major is likely to be heard and remembered compared to the thousand words from me, as an official". Similarly, an NGO interviewee commented that the statement from the Mayor will likely be cited by the mass media rather than from ordinary officials.

There has been wide recognition in the literature of the value of political champions in adaptation (Gupta et al., 2010; Pasquini, Ziervogel, Cowling, & Shearing, 2015). Political

leadership is critical to "institutionalize" the program that is fundamental for enhancing local adaptive capacity (Bulkeley et al., 2009, p. 14) and lacking this leadership may be one of the shortcomings for adaptability (Biesbroek et al., 2011). Cohen (2012, p. 10) defines political entrepreneurs as "individuals who hold elected leadership positions in Government".

On the one hand, sustainable urban development needs 'radical change' to shift the status quo of development practices to more innovative action in the policy-making process (Wittmayer, van Steenbergen, Rok, & Roorda, 2015). On the other hand, decision-makers are largely risk averse and are unlikely to take action until there are favourable conditions (Howlett, 2014). Thus, the presence of political leadership has been seen as necessary for changing existing plans more quickly (Pasquini et al., 2015), because during the transition or policy changes "old and new policies tend to coexist" (Meijerink & Huitema, 2010, p. 7). Moreover, in cases where national regulations and examples of best practice are absent, coordination could be a critical barrier. Here, political leaders can overcome obstacles by forcing sectors to work closely and finding synergies for adaptation programs (Wamsler et al., 2014). This case study outlined in this thesis also drew attention to the role of the Mayor in fostering adaptation through the partnership with the Asian Cities Climate Change Resilience Network (ACCCRN). By joining this program, city government has to show their commitment to responding to the current and future climate changes.

7.7.2 Local Heroes

Another common theme raised by key informants for successful mainstreaming was the presence of local champions or policy entrepreneurs. This means "advocates for policy proposals who may be inside or outside of government, groups, or individuals, but who share the defining characteristic of a willingness to invest their resources—time, energy, reputation, and sometimes money—in the hope of future return" (Crow, 2010, p. 300).

As highlighted above, since the leadership capacity of the (acting) Mayor was weak, policy entrepreneurs in the middle level of governmental echelons took a role in driving adaptation initiatives among relevant agencies (Interviewee LS3). Key respondents actively involved in the interagency working group also noted that government officials in the middle level were mainly responsible for adaptation projects, while senior officials were rarely aware of mainstreaming of adaptation issues (such as day-to-day adaptation policies and practices) (Interviewee LS2, LS4).

An interviewee who identified as a local champion provided an example of how he tried to distribute his card to as many participants as possible in seminars or international workshops with the expectation there would be cooperation among adaptation actors across different countries.

Additionally, it was recognised that there was extra workload because of these projects, sometimes including nights and weekends (Interviewee LS2), without any additional income. Another respondent added a similar view that there should be pioneers and volunteers for new ideas and policies in every organisation because it was unlikely that all people within organisations would be supportive (Interviewee LS1). He mentioned several names (of active members) in an adaptation working group (city team) from different backgrounds (including relevant agencies, universities, and NGOs) as examples of local champions.

A great deal of attention has been paid to the important role of administrative champions in adaptation agendas (Crow, 2010; Dannevig, Rauken, & Hovelsrud, 2012; Holgate, 2007; Kernaghan & da Silva, 2014; Pasquini et al., 2015; Wellstead & Stedman, 2015). Middle-level managers are the most important persons to ensure the sustainability of adaptation strategies as they are responsible for providing data and feeding policy advice for higher-level decision makers (Wellstead & Stedman, 2015). This thesis also finds that local champions play important role in pursuit of mainstreaming of adaptation.

These local heroes are critical in initiating coordination across sectors for gaining greater legitimacy and building networking (with universities and private sectors) (Wejs et al., 2014), as well as being a prerequisite in pioneering new approaches (Kernaghan & da Silva, 2014). Crow (2010) argues that policy entrepreneurs with a particular expertise arguably have more power, leading to more effective policy change. The case study outlined in this thesis found similar results where local champions mainly have the expertise in urban planning or environmental issues. However, as one of interview participants warned, these administrative champions usually did not have enough power to influence overall decisions in a broader local development policy landscape/making process. They were officials graduated from IPDN (an education institution under the Ministry of the Interior aiming to create bureaucrats) that had political and administrative power to influence the city's policy outcomes.

7.7.3 The Role of Foreign Donors

The role of international donors has been noted as one prime impetus toward local adaptation (Anguelovski et al., 2014; Lasco et al., 2009). This thesis also indicates that foreign aid organisations are central in the galvanising of mainstreaming adaptation strategies in Semarang. The majority of adaptation initiatives in Semarang were funded by foreign donors. Some of them are then replicated; for instance, rainwater harvesting projects by relevant agencies (i.e. the city's Environmental Protection Agency) financed by local budgets.

Working with third party entities, mainly foreign aid organisations, also emerged as a key strategy for adapting to climate change in several developing countries (Kernaghan & da Silva, 2014). In the case of Semarang, the Asian Cities Climate Change Resilience Network (ACCCRN) projects funded by the Rockefeller Foundation and Deutsche Gessellschaft fur Internationale Zusammenarbeit (GIZ) through its Policy Advice for Environment and Climate Change (PAKLIM) program are prominent partners. There are two types of interactions between donor and project recipients; they can directly work with local governments and NGOs or indirectly work through providing some assistance (particularly financial) (OECD, 2009). ACCCRN used the former approach while PAKLIM focused on the latter by providing policy recommendations.

An analysis of the respondents' data suggests that international third party partners were seen as both providing funds and providing assistance to design a policy framework for long-term results. International players are an important funding source for local adaptation (Carmin et al., 2012). Channelling the funds directly to local-level projects rather than through the national government is usually preferable to avoid 'bottlenecks' and red tape (Tillema et al., 2010). The lesson from empirical practices in Latin America and the Caribbean (LAC) suggests that the role of higher authorities and transnational entities cannot be ignored (Hardoy & Lankao, 2011).

Sherman and Ford (2014) demonstrated in a case study in Bhutan that relying solely on local professionals in locations with limited human resources can cause delays (Sherman & Ford, 2014). As mainstreaming needs policy change and the redesign of development plans, donor-driven approaches may exist (Gupta, 2010). But donors' interventions will be more effective if there are good enablers such as political champions and shadow organisations (Lassa & Nugraha, 2014). One interviewee expressed concern that the majority

of adaptation projects in Semarang were financed by donors; thus, the long-term sustainability of mainstreaming adaptation could be threatened after donor interventions terminate (Interviewee LS3). The data from Semarang suggests that donors can provide a stimulus for adaptation uptake. This is particularly true in the case of lack of capacity (funding, expertise, and clear national guidance). The role of international organisations in the initial adoption of adaptation measures has also been reported in a number of studies that found that local government responses to climate change are mainly driven by national and international actors due to the government's limited capacities (Solecki, Leichenko, & O'Brien, 2011).

7.7.4 Partnership with Non-Governmental Actors

Respondents who worked for Semarang City felt that many NGOs at the local level had limited expertise in environmental management and were unfairly critical of government initiatives (Interviewee LS3). In Semarang the number of NGOs interested in the adaptation agenda is limited. At the time of the interviews, there were only two engaged NGOs; however, only one has remained active in adaptation measures. A local NGO named Bintari plays a pivotal role. In Semarang, almost all interviewees praised the work of Bintari. An example cited was that Bintari helped to "sell" adaptation projects (in this case, mangrove restoration) to private sectors overseas when domestic players were not interested or the city government did not allocate funding due to the lack of a legal basis. In Indonesia, NGOs serve as 'intermediaries' between local leaders and the population as well as between international and local actors (Aspinall, 2013).

There is also recognition from the interviews that the role of universities/research institutes is crucial in mainstreaming. Their role is to link science with policy output (McAllister, McCrea, & Lubell, 2014; Sova, Chaudhury, Nelson, Nutsukpo, & Zougmoré, 2014). As scientific institutions, universities and research centres are the core for spreading climate risk information to decision-makers, due mainly to the fact that they may know better how to manage the risk which is a critical input for adaptation (Kok, Metz, Verhagen, & Van Rooijen, 2008). Universities can contribute by enhancing the technical capacity of local staff (Kernaghan & da Silva, 2014) and can increase credibility (Mehrotra et al., 2013).

In the case of Semarang, local universities such as the Diponegoro University, Soegiapranata University, and the National University of Semarang play a key role in the process of developing climate impact assessment (Bisri, Salim, & Suroso, 2012). One respondent emphasised the role of universities in analysing, writing, and documenting policy options and reports (Interviewee LS3). This is unlikely to be done by government employees alone (Interviewee LS4). Kernaghan and da Silva (2014) also find that Da Nang University in Vietnam has a crucial role in developing hydrological modelling to predict the potential impacts of climate change over the next 30 years.

There is evidence from the interviews that larger, urban-based local governments commonly possess a wide range of resources needed to adapt compared with those in small and remote locations (Mukheibir, Kuruppu, Gero, & Herriman, 2013; Pasquini et al., 2015). Respondents noted that larger cities, like Semarang, had many opportunities because of the availability of operational resources such as better revenues, capital, the presence of universities/researchers, NGOs, and private sectors. For instance, in Semarang, there are several big and reputable universities that provide input for adaptation measures. Furthermore, there is evidence from the interviews that the availability of human capacity is a major determinant and impetus for adopting mainstreaming. This capacity links with the presence of universities/research centres as 'knowledge brokers. However, not every region in Indonesia has this resource available to them; therefore, the role of the national government to provide detailed and locally relevant information on an impact assessment to local governments is considered as crucial. Thus far, this role has been largely taken by international development aid agencies.

7.7.5 The Effectiveness of the Lead Agency

In its initial phase, when the Semarang local government commenced mainstreaming adaptation, the Environmental Protection Agency was the lead agency responsible for coordinating other line agencies (five line agencies, three universities, three NGOs, two private sectors). The results, however, were sub-optimal. This slow progress was largely caused by three reasons. First, the environmental agency was seen to have a lack of authority in influencing the overall policy process. Second, they were too focussed on environmental concerns. Third, the environmental office was located far from the city centre which in this case hindered coordination.

In such a situation, after around 2 years, the Mayor decided to hand coordination over to Bappeda to enhance interagency collaboration. As an organisation responsible for development planning and budgeting, it was recognised that under Bappeda leadership, the coordination would become more effective in governing overall policy plan and facilitating the cross-sector adaptation interventions.

Following this change, Bappeda began to map the existing stakeholders and identified several gaps. The most obvious were the limited knowledge about adaptation programs and mechanisms. In order to improve these stakeholders' skills, the team attempted to build partnerships with donor agencies for training and workshops. Bappeda chose this strategy because it was less costly (often free of charge) and second, by building partnerships with international entities, the local actors could learn from their international peers (Interviewee LS1). Bappeda also tried to expand the team membership beyond environmental agencies to include the Local Agency of Disaster Management (BPBD), the Transportation Agency, and the Urban Planning Office.

7.8 Conclusion

This chapter has examined several challenges and key strategies of the local policy actors to promote adaptation. Factors that contribute to the adoption of adaptation into policy planning are the experience of extreme calamities, assistance from foreign funding organisations, and support of non-government actors such as NGOs and universities. It is obvious from the case study reported in this thesis that in the initial process of mainstreaming in Indonesia, the role played by international agencies is essential. They contribute to both providing start-up adaptation funding and expertise that is relatively scarce in Indonesian cities and districts. Due to its dependence on third parties, the willingness of local government staff to work with non-government actors is also vital. This partnership will enhance policy formulation and lead to more effective implementation. In this regard, partnerships with non-governmental entities may also help to improve the maturity of democracy (democratic governance) in Indonesia.

Although mainstreaming has been mentioned explicitly as one component of local development planning, there has been so far relatively little progress in planned adaptation. Lack of adaptation understanding, less synergy and interaction among key actors, and limited human resources are among the primary factors that impede successful adaptation. It is also apparent from the interviews that adaptation actions in Semarang can be described as a "mainstreaming minimum" and that "climate proofing" means "to ensure that projections of climate change are considered in the decision-making of relevant government departments

and agencies" (Klein, 2010, p. 76). Adaptation activities are mainly related to infrastructure rather than to an ecosystem services approach, and adaptation efforts in Semarang are typically reactive. This can be caused by the difficulties to differentiate between ecosystems based service and adaptation (Wamsler et al., 2014) and the considerable doubt that environmental measures are the best solution to climate change adaptation (see Pasquini et al., 2013).

This chapter has also sought to identify some strategies to overcome institutional barriers. This thesis revealed that although adaptation has been considered as part of the Semarang city planning agenda, internalisation of these issues within relevant agencies is still limited. This gap is a result of several reasons but political leadership is a key determinant. In the early stages of adaptation projects, these leaders - be it in the top rank of elected officials or administrators - are significant (Pasquini et al., 2015). This political will (from local leaders) is particularly essential in the 'agenda setting' phase (Crowley, 2009). This thesis suggests that to ensure the adoption of mainstreaming and the sustainability of adaptation decisions within local policy areas, the presence of political and administrative champions is a significant factor. Mayors, in particular, can redirect and rearrange administrative procedures to facilitate cooperation and joint decision-making. In other words, Mayors can influence the development planner to put adaptation and environmental issues at the core of a city's policy (Tickell, 1997). As strong leadership, attention, and commitment from the Mayor to the adaptation agenda is the most effective way to implement adaptation strategies at the local administration, a serious challenge is therefore how the national and provincial authorities can facilitate the adoption of adaptation measures into local candidates' working priorities. A consistent commitment from the top rank of elected figures is a catalyst for adaptation (Reed et al., 2011). This ensures that these elected officials understand the urgency of incorporating climate change action into development policies; this is an important prerequisite because they have the political authority to encourage action (ADB, 2005). A potential answer to tackling this poor understanding surrounding the adaptation agenda among elected officials, as suggested by one respondent, is by providing a workshop, seminar, or other discursive forum for local leader candidates before local elections take place. At the moment, both the Mayoral and Regent elections are carried out simultaneously in Indonesia; this idea can potentially provide an effective way to introduce climate change problems and solutions.

In the case study outlined in this thesis, leadership from the Mayor was also found to be the main driver for mainstreaming adaptation. Political champions had the key role of encouraging adaptation initiatives among relevant units. In Indonesia, the effectiveness of governmental organisations depends largely on strong political leadership (Phelps, Bunnell, Miller & Taylor, 2014). It is also evident from this thesis that the leadership factor, particularly from elected positions, is critical for facilitating adaptation initiatives at the local level. This relates to the continued presence of a paternalistic leadership model (that accentuates harmony and collectivism) in Indonesia (Irawanto, Ramsey & Tweed, 2012). Hence, one of the central components in enhancing the government response is the role of elected officials to effectively encourage and provide policy direction across relevant agencies.

This case demonstrates that when the national government is providing weak leadership, the presence of international agency funding is central in initiating local mainstreaming of adaptation. The absence of a strong and clear mandate from central government has led to the delay in the mainstreaming of adaptation at the city and district level. However, in the case of Indonesia, the national level has provided the opportunity for local government to access funding from international sources. Kernaghan and da Silva (2014, p. 48) suggest that "donor funding may be used most effectively to create the conditions for long-term change in how policies, plans and ultimately decisions are made". The case presented above provides important learning that mainstreaming of adaptation needs to be planned and supported by a diverse range of stakeholders from an individual at the city level to international agencies.

Chapter Eight: Social Capital and Grassroots Adaptation Strategies for Flood Hazards in Semarang

8.1 Introduction

The three previous chapters examined the formulation of adaptation into a development planning agenda at the national level and how this initiative is manifested at the local level. As discussed in Chapter Two, another important aspect in inducing adaptation is how societies respond and cope with immediate threats. This chapter reviews the practices and processes that enable communities to adapt to flooding events based on indigenous knowledge, cultural practices, and social connectedness. The investigation focuses on community adaptation to flooding events in Semarang, as these occur frequently in the region. The empirical findings presented in this chapter conclude that social capital is critical to community adaptation efforts. Bonding and bridging ties are important for enhancing adaptive capacity by increasing solidarity and a sense of social responsibility. More than that, vertical ties (linking social capital) are significant for promoting innovation and experimentation as well as providing financial support.

The chapter is divided into three main sections. It starts with a description of previous research regarding the relationship between social networks and resilience. The second section provides a general background on floods in Semarang and the study areas in terms of their geographical setting, socio-economic aspects, and the current climate hazard. The third section analyses adaptation strategies and the role of social capital in coping with the impacts of flood hazards.

8.2 Social capital and Resilience

There is growing recognition among academics, development practitioners, and international funders that adaptation has to focus on the level where climate change impacts have been felt, which is at the household and community levels (Heltberg et al., 2009; Koerth, Vafeidis, Carretero, Sterr, & Hinkel, 2014). The essential dimensions of adaptation such as vulnerability, resilience, and adaptive capacity are manifested at this level (McNamara & Buggy, 2016). Heltberg et al. (2009, p. 95) argue that "managing climate risks has traditionally been the responsibility of households, except for the largest extreme

weather events and natural disasters where national governments and donors have stepped in".

Community-Based Adaptation (CBA) refers to "an autonomous, bottom-up approach to adaptation, based on the premise that, through participatory learning and action, communities are best able to identify, prioritise and implement climate change adaptation" (Prowse & Snilstveit, 2010, p. 250). McNamara and Buggy (2016) identified several factors why CBA is necessary: the increasing attention on the human dimensions of climate impacts; the recognition that local knowledge is critical for strengthening community resilience; and the need to adapt in the areas where such impacts are already being observed. Prowse and Snilstveit (2010) further point out that community-based responses are usually implemented in small-scale development projects and require local organisations' engagement. CBA is recognised as an entry-point for the mainstreaming of local-level adaptation planning (Dodman & Mitlin, 2013).

As argued in Chapter Two, social capital is the key factor in creating more resilient communities. Besides physical and human capital, social capital has been considered to be an important component in good quality community life (Joshi & Aoki, 2014). Empirical research in the development literature has revealed positive dimensions of social capital (e.g., adaptation to climate change, natural resource management, and disaster risk management) (Brunie, 2009). Social capital is defined as: "relationships of trust and reciprocity between individuals that facilitate collective action" (Beard, 2007, p. 608). Studies have revealed that social capital plays a very critical role in shaping victims' responses to flooding hazards (Aßheuer et al., 2013; Gaillard, Pangilinan, Rom Cadag, & Le Masson, 2008) and "community-level social capital may serve as a way to increase people's civic engagement and counteract the negative effects of low socioeconomic status" (Bedolla, 2007, p. 8). The concept of social capital usually consists of three elements: bonding, bridging, and linking social networks. Bonding networks refer to the relationships within and between households; it can be immediate family, close friends, or neighbours who live in a particular area with a high degree of similarity in terms of race, ethnicity, and dominant religion (Aldrich, 2011). Bridging social capital is defined as the relationship between "members of the group or network to extra-local networks, crossing ethnic, racial, religious groups" (Joshi & Aoki, 2014, p. 2). While bonding and bridging are horizontal relationships, linking social capital involves vertical linkages (to higher authorities like the local and national government) (Zaumseil, Von Vacano, Schwarz, Sullivan, & Prawitasari-Hadiyono, 2014). van Kasteren

(2014, p. 8) argues that "all three types of social capital are important in adaptation because multi-level and multi-actor engagement is essential for efficient and effective adaptation".

Understanding the way each household copes with disaster, individually or in groups within the community (through mutual help with other households), and outward relationships with NGOs and government agencies, plays an important role during disasters and in post-disaster management (Islam & Walkerden, 2014). Hawkins and Maurer (2009) give an example of the role of social capital after hurricane Katrina in New Orleans where bonding ties were critical for immediate actions but bridging and linking networks were important for long term sustainabe community development. In a study in Kobe, Japan and Gujarat, India, it was found that social capital and leadership were crucial aspects of disaster recovery processes (Nakagawa & Shaw, 2004).

A number of scholars argue that establishing networks with outsiders who have political and economic power (e.g., NGOs, private sectors, and local government) are particularly important (Ebi & Semenza, 2008; Islam & Walkerden, 2015; Joshi & Aoki, 2014; Maharjan & Issahaku, 2014). Linking relationships can provide resources, ideas, expertise, and information that are cannot be found within communities through bonding or bridging capital (Aldrich, 2011; Ebi & Semenza, 2008; Turner, 2007). Societies that rely on bonding ties only will be likely to be less effective in responding to hazardous events due to the limited capacity to provide aid and other assistance in a timely manner (Aldrich, 2011). On the other hand, societies that are relatively open to communicating with external parties will be better able to achieve more equitable and sustainable ways of living (Wetterberg, 2007).

Communities with three types of social capital (bonding, bridging, and linking) are found to be more resilient than those who just have one type (or no) social connections and relations (Peters, 2010; van Kasteren, 2014). Despite its positive aspect, social capital may also bring negative consequences. Joshi and Aoki (2014, p. 2) have highlighted that "the elements of trust and networks may exclude people from the community". Portes and Landolt (2000, p. 532) identified four negative effects of social capital; namely, "exclusion of outsiders, excess claims on group members, restrictions on individual freedoms, and downward levelling norms". A case study in southeast India demonstrated that "minorities, outcasts, and non-members in those hamlets were often excluded" in the post-disaster recovery process (Aldrich, 2011, p. 82).
In sum, the presence of all three types of social capital in the community-based adaptation process is key for increasing adaptive capacity because climate adaptation requires multi-stakeholders' engagement with formal and informal networks. However, for longerterm community resilience, linking social networks is particularly important.

8.3 General Background on Floods in Semarang

With more than 5500 major rivers flowing throughout Indonesia (Osti, Hishinuma, Miyake, & Inomata, 2011), floods are one of the most common hazards (Marfai et al., 2008) and are predicted to increase in frequency and size from 2000 to 2030 (Muis, Güneralp, Jongman, Aerts, & Ward, 2015). The causes of this increasing hazard are increasing rainfall and sea-level rise due to climate change, inappropriate land use practices, a widespread weakness in spatial planning, and population growth (Kardono, Winanti, Riyadi, & Purwanta, 2012). This type of disaster will mostly affect water resource, fisheries, agriculture, and the health sector (BAPPENAS, 2010). Moreover, these floods will have devastating impacts, particularly in Indonesia's urban areas such as Jakarta (Hellman, 2015; Sunarharum, Sloan, & Susilawati, 2014; Texier, 2008; van Voorst, 2014; Wilhelm, 2011), Semarang (Harwitasari & van Ast, 2011; Khadiyanto, Soetomo, & Hadi, 2015; Marfai et al., 2008; Sutanta et al., 2013), Surabaya (Garnaut, 2009), Surakarta (Hidayat, Sungguh, & Harianto, 2008; Taylor & Peace, 2015), and Palembang (Anaheryana, Setiawan, & Purnama, 2015). The situation becomes increasingly complex as low socioeconomic status communities reside in the disaster-prone areas, and governments have a limited technological capacity to deal with these hazards (Marfai et al., 2008). In this context, the Indonesian government has not formulated a coherent and effective policy response (van Voorst, 2014).

As explained earlier, Semarang has been noted as one of the Indonesian cities most vulnerable to flood events (BAPPENAS, 2010). With 21 rivers flowing through the city, Semarang is vulnerable to severe flooding (Semarang City Government, 2016). Recent studies (Harwitasari & van Ast, 2011; Rahardjo, 2000; Sugiri, Buchori, & Soetomo, 2011; Sutanta et al., 2013) find that floods stem from the combination of a poor drainage system, upstream environmental degradation, heavy siltation in the downstream, and high precipitation.

Flooding is part of life for Semarang's inhabitants. Residents associate the city with floods due to its regular inundations and coined the local epithet "Semarang kaline banjir"

(the river is always flooding) (Khadiyanto et al., 2015; Suwitri, 2008). Genangan or banjir biasa (local flooding due to overflowing water from the river during seasonal monsoon rain), rob (tidal inundation), and banjir bandang or banjir kiriman (flash floods from the upstream sites) are all among the water-related hazards that affect people in Semarang (Harwitasari & van Ast, 2011; Sutanta et al., 2013). Situated in low-lying areas and close to the sea, these regular floods have caused death, tremendous property and infrastructure damage, as well as physical and mental health problems (Maimunah et al., 2011). Highland subsidence rates have worsened the extent of flood risk (Abidin et al., 2013). Due to overuse of groundwater resources (Chaussard, Amelung, Abidin, & Hong, 2013; Marfai et al., 2008), city inhabitants also experience clean water shortages (Hadipuro & Indriyanti, 2009) and salt water intrusion (Rahmawati, Vuillaume, & Purnama, 2013).

The Bringin watershed is one of Semarang's flood-prone sites. In the upper southern basin, the Bringin River is characterised by a steep slope with elevation up to 230 m above sea level (Sucipto & Sutarto, 2009). The river, spanning around 29 km or 2,963 hectares, flows northwards to the Java Sea, exposing seven villages with 70,213 inhabitants to the risk of flooding (Waskitaningsih, 2012). Inhabitants along the Bringin watershed live in constant fear, notably during rainy seasons, of two types of flooding: overflowing flood (genangan) and flash flood (banjir bandang). Overflowing flooding is perceived by the local community as tidak berbahaya (not dangerous) because these floods typically engulf the land slowly. Flash flooding (banjir bandang) is perceived as the greatest threat to the residents living close to the river banks. Large flash floods have occurred recently in the Bringin watershed three times in 1993, 2000 and 2010. The 2010 flood, for example, exceeded local predictions in both magnitude and damage. It killed seven people and several thousand houses were inundated with water (Nurromansyah & Setyono, 2014).

In recent years, a growing literature has explored how poor people act collectively to cope and adapt to extreme events, including floods, and concludes that social capital is critical to how local communities deal with adverse conditions and their consequences (Aßheuer et al., 2013; Braun & Aßheuer, 2011; Dany, Regan, Taplin, & Bajracharya, 2013; Rashid, 2000). In particular, researchers examined community-based adaptation practices, coping strategies, and flood governance in various parts of Indonesia. It was found that flood-affected people were reluctant to move even if the impacts were getting worse (Harwitasari & van Ast, 2011) and that economic considerations received a higher priority than safety (Khadiyanto et al., 2015). In order to minimise risk, victims mainly relied on collective action

and helping each other using (informal) social connectedness (Wilhelm, 2011) in the absence of proper government flood policies (van Voorst, 2014), poor joint actions and unclear responsibilities of various stakeholders (Djalante, Holley, Thomalla, & Carnegie, 2013; Marfai, Sekaranom, & Ward, 2015) as well as a lack of community participation (van Voorst, 2016).

Scholars have also addressed physical or structural community-based adaptation to tidal flooding in Semarang's coastal areas (Harwitasari & van Ast, 2011; Khadiyanto et al., 2015; Marfai et al., 2008) but, to date, a 'soft' coping strategy of household-level responses to riverine flooding does not exist. This chapter fills this gap by examining the effectiveness of social capital in terms of how local communities cope with regular flooding through horizontal relationships (family members and neighbours) and vertical linkages (local government). Following on from these previous works, this chapter seeks to contribute to this emerging subject by identifying the strategies of local communities to adapt to flood hazards in the Bringin watershed. Furthermore, this chapter demonstrates how the residents of the riverbank are developing their own ways to anticipate future floods given the lack of adequate and coherent government policies. This chapter will analyse the importance of social ties (bonding, bridging, and linking social networks) during and after flood events. Up to now, the role of social capital in the context of disaster management practice is still underresearched (Islam & Walkerden, 2014).

8.4 Study Site

Three areas and communities within the City of Semarang region were investigated: Wates, Wonosari, and Mangunharjo villages along the Bringin watershed. These three villages were selected as they are highly exposed to flooding and flash-flooding hazards and have experienced regular flooding and significant losses in the past. The three communities were also selected as they had advanced responses to the negative consequences of urban development and climate change that have increased flood risks. The first location, Wates village, is located in the upstream area of the Bringin watershed, while Wonosari and Mangunharjo villages are located downstream. The study sites are typical of rural areas in Indonesia, locally called kampung (urban neighbourhoods), and are characterised by a dense population and relatively low-income households. Although administratively under the City of Semarang, these kampungs are rural in their setting due to their location (in the fringe areas/city outskirts). Dwellers earn their living largely from activities in the informal economy with, consequently, unstable sources of income.



Figure 12: Location Map of the Study Area

Source: Waskitaningsih (2012).

8.4.1 Experiences of Flooding

Flood-affected communities describe their areas as *daerah rawan banjir* (flood-prone areas) meaning that floods have long been a regular experience during the rainy seasons. As noted previously, this area is subject to both seasonal inundation and flash flooding. Interviewees reported that floods occur almost every rainy season (3 months of the year: January, February, and March). These floods rise slowly with a height around 30 cm. Although all interviewees in the study areas perceived this flood as a disturbance, local communities in low-lying areas of the Wonosari and Mangunharjo neighbourhoods did not feel that this flood caused harm or significantly affected their livelihood. For inhabitants along the Bringin River, periodic floods are 'a fact of life' (see also Rotberg, 2013, p. 603).

On the other hand, interviewees reported that the last flash flood was very short in duration but *membahayakan* (dangerous and life-threatening). The flood arrived on the afternoon of 9th November 2010. Before flooding, in the upstream of the Kelurahan Wates area, the cloud was thick and the conditions were dark. One respondent (who was teaching at the primary school not far from the Bringin River at the time of flooding) reported that the weather was unusual; therefore, he decided to stop the class and let the children go home. After he did so, torrential rainfall with large hail stones occurred. He reported that the ceiling in his house collapsed and he was not able to save anything except certificates and other important documents. The rain only occurred for approximately one hour; however, he was surprised by the speed and the magnitude of the flood. The water rose suddenly and reached 3 metres in height in some places.

The vast majority of informants said that this type of flooding had never happened before. Usually, if there was flooding, it came and subsided slowly. One respondent presumed that besides the heavy rainfall, it was probable that the dam upstream (located at an elite housing complex) was opened, contributing to the flash flood downstream. The opening of the dam as a determining factor for the flash flood was also suggested by the majority of informants. It was reported that seven people died and the flood damaged hundreds of houses, vehicles, and other basic infrastructures such as roads, bridges, and school facilities. Fortunately, the flash flood occurred in the afternoon just after midday which allowed local people to escape from the worst of the flooding; furthermore there were no students in the school near the river. This helped to minimise the casualties, as several informants believed that if the flood occurred at night, there would have been a higher number of victims.

A number of reasons for the recent large flash flooding can be attributed to the poor maintenance of the river course system (water clogging as a consequence of high siltation) and the intense rainfall upstream where uncontrolled land use had occurred in the form of a massive housing development. The tendency of people in Semarang to move to upstream suburbs is a strategy to avoid flood hazards (Prayoga, Esariti, & Dewi, 2013). Indeed, urbanisation has also been identified as a contributing factor in increasing floods in Semarang (Harwitasari & van Ast, 2011; Sutanta et al., 2013) because housing estates have encroached on conservation areas (Sugiri, Buchori, & Soetomo, 2011). Respondents in the community said that land use upstream was the main factor causing the floods, "in the past, the uphill was hutan jati (teakwood) and karet (rubber/Hevea brasiliensis) that can be an absorber for the rain water" (Imron, Mangunharjo, Head of KSB (Kelompok Siaga Bencana/disaster preparedness groups) and RT (Rukun Tetangga/Neighbourhood Unit Chairman). But respondents in this thesis who were government officials in Kelurahan Wates did not point directly to such land use transformation activities as a primary contributor to the flood in the foothills. They pointed to climate factors as the main cause of the disaster (Htn, Wates, kelurahan official). Other participants also supported the argument that the climate had changed:

In the former time, floods were controllable; people could handle and live with water. For example, in early October, usually the rain came and December was the most intense rainfall. But at the present time, during September, which is usually the driest time, the rain comes. Local inhabitants described this phenomenon as *iklim telah berubah* (the climate has changed)" (Khaeruman, Wonosari, RT chairman).

Respondents argued that this flooding was also partly due to the habit of residents throwing rubbish into the river, "they, usually immigrants, throw their domestic garbage directly to the river" (Htn, Wates, kelurahan official). Another informant also argued: "even it had been prohibited, the fact is that the river is full of the rubbish. They refuse to listen if we warn them" (Misoni, senior resident in Wononsari, trader).

In the 2010 flood event, rain was normal in the downstream areas. The interviewees described the last flooding with comments such as "the floodwater was unusual" (*tidak seperti biasanya*). There was not enough time for people to prepare themselves for evacuation, or to save their valuable belongings, as a substantial amount of water entered their dwellings rapidly. The lack of adequate disaster preparedness was also due to the fact that the flood-warning system was ineffective. Community members used indigenous

knowledge to predict floods. The common practice was monitoring the water level in the riverside. This has mainly relied on the dwellers living near the river or other dedicated volunteers watching the water's behaviour. Previously, flood alerts only used visual clues such as the water level under the bridge or the *bibir sungai* (river surface). When the water level increases quickly and reaches the bridge level in less than one hour, the volunteer responsible for monitoring flood waters will immediately warn residents about the potential risk of flooding by hitting the *kentongan* (hollow bamboo or wooden log), beating an electricity pillar, or using the mosque loudspeaker. In short, the combination of several factors like land use change upstream, river sedimentation, and the changing climate, are implicated in more regular and intense flash flooding along the Bringin River.

8.4.2 Problems Caused by Floods

The flood impacted on local communities' activities including industry, trade, construction, transportation, education, and agricultural sectors. It affected the primary economic activities of the inhabitants along the Bringin River due to the damage of bridges, roads, and public schools. Flood-affected people also had to repair their houses which means extra household spending; this absorbed their limited income. Due to their low educational attainment (mostly elementary school and junior high school), the majority of local residents in these communities worked in the informal sector (for instance, as traders in traditional markets, electronic appliances repairs, street vendors and labourers in the industrial parks nearby). Their low socio-economic situation exacerbated the impact of flooding due to their low financial incomes and irregular employment.

One interviewee from Wonosari said that the bridge linking two neighbourhood units (Rukun Tetangga) washed away in the 2010 flooding. The myriad of debris also disrupted schooling as the public schools had to be cleaned up: "When the flood struck in 2010, all the documents and computers here [at the primary school] were damaged, so the floor was lifted. Now all the computers are new" (Umi, Wonosari, school guard's wife). Another woman reported that her house was washed away (Bu Mar, Wonosari, housewife). Besides causing damage to houses and public facilities, the floods also left several residents suffering depression. In previous literature, traumatic events can potentially cause stress disorders (Bonanno, 2004; Crabtree, 2012). In Wates, for example, several people experienced symptoms of depression. Faizin, an informant from Wates, reported that his neighbours suffered depression due to this life-threatening flood onset, "Every time it rains, she is scared

and felt sick, so she moved permanently to her child's house". One child in the participant's neighbourhood also suffered severe traumatic stress: "every time there is rain on a Tuesday [the day when the flash flood hit], she always feels frightened". Unlike adults, children are seen as being more vulnerable at the time of disastrous situations due to their physical, psychological, and dependent relations on adults (Zahran, Peek, & Brody, 2008).

Until now, 5 years after the big flash flood, anxiety about other potential flood occurrences is widespread among riverbank dwellers. The following statements were examples of the fear expressed by flood-affected residents:

Every time the rain comes we are afraid because of the suddenness of the [2010] flood (Imron, Mangun Harjo/Chaerumen, Wonosari).

When clouds become dark, we prepare for evacuation and save our belongings (to the second floor or higher ground) (Umi, Wonosari, school guard wife).

If the rain falls for more than 3 hours, teachers let school children go home earlier, or the parents pick up their children (Faizin, Wates, Primary school teacher).

These quotes illustrate participants' constant fear, helplessness, and desperation over their current situation. These current coping practices were also perceived not to be effective. For example, when precipitation is intense for more than 2 hours, river bank dwellers usually start to move their belongings to the second floor. According to a key respondent who works for a local NGO, these kinds of coping mechanisms were not effective:

If the water level rises above the first floor, what should they do? There was no evacuation route map, no communication with people living upstream, no warning on the water levels, and no temporary shelter. Letting the school children go home during heavy rainfall was also dangerous because there was a probability the flash flood would hit while they were going home.

This quote reflects the fact that the ability of flood survivors to return to normal conditions requires more than just repairing houses and infrastructure. Watson et al. (2009, p. 915) have emphasised that "restoring a sense of place and security" beyond "putting material things back to normal". Recovery should include intangible parts of community life- the psychological vulnerability the flood causes. This issue has been overlooked in disaster-relief efforts in Indonesia.

The evidence presented here shows that the flood caused not only a loss of valued possessions and a reduction in wellbeing, but also psychological stress and illness. One senior informant reflected on the current flood phenomena from the Javanese philosophical point of view and said: "now we are in the period of *maga bathanga*; this means all (actors) are dead". This is based on The Javanese alphabet *hana caraka* (there were two messengers), *data sawala* (quarreling with each other) *padha jayanya* (they were equally strong), and *maga bathanga* (both of them died)" (Beatty, 2005, p. 72).

8.4.3 The Government's Response to Floods

There was frustration and anger expressed by flood survivors regarding the government response to flooding, and not just along the Bringin River. Van Voorst (2014, p. 340), in her recent studies in Jakarta, argues that "the Indonesian government has not come up with a real solution to the flood problem". Texier (2008) found that the government strategies of coping with flood are ineffective because they do not take into account the root causes of vulnerability, but are more focussed on technical solutions.

This claim was also reported by the informants interviewed. A woman explained that government officials came after the water had receded, just to see and eat the food in the public kitchen. The head of KSB (disaster preparedness groups) reported that he hired a professional cleaner due to the lack of a government response. Another commented that "government assistance (if available) should pass through (*melalui*) the Kelurahan (sub-district government/the lowest level of government administrative structure) or there is no guarantee that this assistance will be distributed to the victims". Other interviewees were concerned about the absence of the Kelurahan role in the flood management actions. Similarly one of the KSB heads in Mangunharjo commented: "if there is any assistance from the government, it must be cut (*disunat*) (by Kelurahan); it has been a "public secret" (*rahasia umum*)". An interview participant, a PKK (Family Welfare Empowerment) activist, noted: "we only received *beras miskin* (low-quality rice allocated for households below the poverty line) to run the public kitchen with no side dishes and gas for the stoves. So we ask other neighbourhoods unaffected by the flood to help".

Some of the participants spoke of how aid from business owners came earlier than government aid. It was associated with the proximity of the industrial zone to the most flood-affected victims, and many of their labourers living in these areas. One KSB chairman reported: "Kelurahan has handed over (*pasrah*) this flood issue to me. So if flooding happens

I have to inform them". An official in Kelurahan Wates noted: "the role of Kelurahan is a mediator between the community and other organisations. For example, when an NGO would like to provide assistance, they first come to us". His colleague added: "we provide Kelurahan statistical data for conducting vulnerability assessments to the NGOs". Similarly, Wonosari Kelurahan officials claimed that the city government had employed their workers to help clear debris and provide emergency aid. These conflicting opinions mirror the previous observations of the distrust many people have toward government (van Voorst, 2014). But one Kelurahan official also recognised that the role of the government is usually reactive (after the disaster); therefore, the residents have their own mechanisms to cope with the flooding, what they have to do, and what they need based on past experiences (Htn, Wates, kelurahan official).

Government planning to solve frequent flood problems was also unclear. According to interviewees, increased siltation led to the clogging that limited water movement. Widening and re-digging were perceived by respondents to help reduce the magnitude of floods. At times, according to an informant living downstream, the local government had planned to normalise the river (*normalisasi sungai*) through dredging and widening of river banks to reduce water run-off from upstream. This program was done through buying the land along the river from residents and relocating inhabitants living in flood zones. But another respondent felt that this normalisation progress had been very slow. This is because of the disagreements between riverbank dwellers and government officials on land price negotiations (*proses ganti rugi*). To widen the river was problematic. Residents living on the riverbank did not want to release their land because the compensation was below market value. In this regard, one Kelurahan official claimed: "it has been proposed to normalise the river stream and improve basic infrastructure from upstream to downstream. But because the budget for these projects was very big, this planning was run by the central government.

Subsequent interviews with key informants revealed some issues around the government's role. A common issue reported by informants was insufficient government assistance during floods. According to a key informant, local disaster management agencies did not have sufficient resources (manpower and funds) to accomplish their tasks "so that they prefer to create volunteer organisations (such as KSB/disaster preparedness groups) and rely on unpaid volunteer participation and commitment to undertake quick responses to disasters" (Faizin, Wates, head of KSB/teacher).

In cases where there was assistance from the government, the assistance was insufficient and at times not useful. For example, the petroleum stoves provided by local Disaster Response Agency (BPBD) for KSB Mangun Harjo were unusable (now people use LPG instead of petroleum) and the shortwave radios for the Kelurahan office of Wonosari was also not useful at night as there were no people at the office then. One interviewee reflected on the government response and stated: "for two years after the big flood, there was no response from the government". These narratives clearly demonstrate participants' perception on the government's incapacity to handle floods in an effective manner.

8.5 Planned and Autonomous Adaptation Strategies

A positive impact of the lack of effort from public authorities was the increasing solidarity among the victims to exchange mutual help and the voluntary contribution from non-government actors such as NGOs, business owners, religious organisations, and individuals by providing food, medicine, clothing, school supplies and building materials (such as cement, rock, and sand). The interviews undertaken in the three communities indicated that local residents had their own mechanisms for anticipating future floods. Several strategies were adopted by communities to minimise the impact of flood hazard including physical and non-physical measures, either at individual household levels or community-based activities. The following section describes the adaptation strategies of the three communities.

Although periodic flooding had brought substantial damage and material loss, the majority of people wished to remain in their settlements. In fact, only a few dwellers moved permanently from all three sites. When asked why they remained in the hazard zones, the general responses by interviewees were the strategic location, social bonding among the community members, the cost of purchasing a new house in a safer place, and "the flood occurs only once a year" (*banjir hanya satu tahun sekali*). In relation to the strategic location, the areas where this research was conducted were close to industrial areas, higher education campuses, health facilities, traditional markets, and inter-city transportation hubs. For example, an interviewee reported: "at first I rented a room here but then I decided to buy a house because of the strategic location, close to the market. As a trader, the market is more important to me than flooding" (Mashuri, Wonosari, RT treasurer/trader). Another advantage, as will be shown in the next section, was the social ties existing in the communities.

Some of the respondents spoke about good relationships and social networking between residents in their neighbourhood. For example, a woman who lived in a high-risk area explained the reason why she decided to stay: "living here was good, everybody respects each other, the dwellers did not like to gossip, which is different with the kampung (village) where I come from" (Bu Amin, Wonosari, street vendor).

Earlier studies on adaptation strategies in Semarang have highlighted the physical/structural measures employed by flood victims including raising the floor or the yard level, construction of additional floors upstairs, and building embankments (Harwitasari & van Ast, 2011; Khadiyanto et al., 2015). Dewi (2007) found that non-physical measures including the willingness to engage with community work (to lessen the flood risk) such as neighbourhood security systems (*ronda*) and cleaning the drainage facilities occurred. These types of strategies were also found in the case study areas outlined in this thesis.

In line with those practices, Table 11 shows a wide range of adaptation initiatives aimed at reducing vulnerabilities at the individual and community level. These strategies are divided into two general categories: autonomous adaptation (adaptation initiated by individuals, organizations and private sectors without government assistance) and planned adaptation (led by the government). To minimise the adverse impacts of disaster (due to climate change) both autonomous (at the household level) and planned adaptation (led by the government) have been suggested as a priority in disaster-risk management (Francisco, 2008). With government assistance, coping strategies at the community level, which are generally inexpensive, would be more effective (Satterthwaite, 2011).

Adaptation Efforts	Adaption Categories
Self-relocation	HLA
Raising the floor	HLA
Construction of additional floors	HLA
Rain water harvesting	HLPA
River embankment	CLPA
Re-digging/dredging and widening river	CLPA
Temporary shelter	CLPA
Evacuation routes	CLPA
Public catering	CLA
Mutual assistance/gotong royong	CLA
Reconstruction/upgrading the bridge, elevation the streets and	CLPA
alleys	
Disaster response team/kelompok siaga bencana (KSB)	CLPA
Neighbourhood patrol/ronda	CLA
Building the dike	CLPA

Table 11: Adaptation Efforts in the Study Area

Floo	l early warning systems	CLPA	
Tab	e key: CLPA=community level planned	adaptation; HLPA=household level	planned
adaj	tation; CLA=community level adaptation;	HLA=household level adaptation	

During the field work in this thesis, it was found that some households had lifted their ground floor as a means of self-protection from flash floods (see Figure 13 below). This was particularly true in the low-lying areas of Wonosari and Mangunharjo while in the higher land of Wates this practice was rarely found. This strategy was recognised as not being helpful in reducing the impact of floods because it needs to be adjusted to the main road that is frequently lifted by the government. In Wonosari, some better-off families built a second storey where they kept their most valuable possessions and as a place to stay during flooding emergencies. This kind of strategy was perceived as useful to many respondents; for example: "I bring up all the light things such as clothes and utensils".



Figure 13: Coping strategies (Photo Credit: Author)

Moving permanently from flood-prone locations was another coping mechanism practiced by several residents. Field observations in Wonosari and Wates areas indicated that several inhabitants had abandoned their properties and had moved permanently. Although migration can be seen as an adaptation failure (Black, Kniveton, & Schmidt-Verkerk, 2013), self-relocation has also been adopted by residents in flood-prone areas in the Philippines (Bankoff, 2009). Interviewees in this thesis pointed out that people who have money prefer to move to higher and safer locations. Their houses were just left damaged and abandoned because no one wanted to purchase them (see Figure 14).



Figure 14: Abandoned Houses (Photo Credit: Author)

An example of household-level planned adaptation was Rain Water Harvesting (RWH). It was recognised that, in urban areas, this technique could be applied to attenuate runoff rates in the drainage system leading to decreased flooding (Campisano, Nie, & Li, 2013). Another study has highlighted that RWH has also helped farmers for agricultural productivity which in turn contributed to sustaining the food supply and improvement of their living conditions (Adhikari & Taylor, 2012).



Figure 15: Example of a Domestic RWH in Wonosari (Photo Credit: Author)

The Local Environment Agency in Semarang introduced this technique to collect water, especially during the rainy season and to reduce overutilization of underground water sources. This strategy served as a means of reducing water run-off which contributes to flooding; at the same time, the water could be used for household purposes such as supplying the toilet and bathroom. It was observed in Wonosari that several households had used these instruments as pilot projects of a local government adaptation program. One respondent explained that RWH is useful, but the cost to install it was unaffordable to most local residents. Thus, RWH is difficult to introduce with the majority of households.

With the assistance of a local NGO, an early warning system, evacuation routes and a temporary evacuation shelter have been made in preparation for future flash flood emergencies. In relation to the flood-warning alert (Flood Early Warning System/FEWS), two devices were installed in the upstream site of Wates. The first was an automatic rainfall recorder (ARR) to measure rain precipitation, and the second was an automatic water level recorder (AWLR) to measure the water level (see Figure 16). With these instruments, information on weather conditions upstream can be transmitted to other flood-prone areas. The role of the early warning system as a tool for disaster preparedness is often ignored or receives little attention in disaster management. Developing early warning systems as an instrument for disaster-risk preparedness has been recommended in several studies (Ajibade & McBean, 2014; Jones, 2010; Seng, 2013).



Figure 16: ARR (*left*) and AWLR (*right*) (Photo Credit: Author)

8.6 The Role of Social Capital in Coping with Floods and Disaster Management

The following sections will discuss common practices of local communities in floodprone areas to increase their resilience through social capital.

The next section will highlight how social capital increases the resilience of the affected populations along the Bringin River.

8.6.1 The Role of Bonding Relationships

In lower socioeconomic status communities in Indonesia, collective actions are emphasised as an important contribution to communities that individuals are often expected to make (Goodwin & Giles, 2003). A recent study on Jakarta's slum dwellers (Marfai et al., 2015; van Voorst, 2014) highlights the importance of social capital to facilitate coping with recurrent flood events.

In Indonesia, where bonding relationships are so vibrant, the role of immediate family to help their relatives to resolve problems can be categorised as "a central social structure" (Stephens, 2008, p. 1178). Earlier studies have found the importance of family support for victims during hazardous crises (Hellman, 2015; Kusumasari, 2015; Mardiasmo & Barnes, 2013). From the interviews carried out in this thesis, relatives and neighbours were the most frequently cited as the people to seek help from in the time of emergencies. This assistance mainly involved providing emotional support, temporary settlement and food. One participant, for example, moved to his older brother's household for 2 days because his own house was messy and muddy. Another example was given by RT chairman in Wonosari:

Because he want to live near our extended family, my brother decided to build a house in this neighbourhood (a floodplain area). The cost for the foundation (located in the foothills) only cost 150 million rupiah; with that much he can buy a house in a safer place.

As noted above, many respondents reported that the service provided by the rescue team from local government (BPBD) was unsatisfactory. One interviewee reported that to reach his neighbourhood location, BPBD took around 2 hours while the flood hit only for 1 hour. With the absence of government assistance in the earlier occurrence of flood, he further explained that help from his neighbours was critical: "my neighbour unaffected by flood and people from the nearby villages came to help without any instruction; they saved my motorcycle and other utensils while I tried to save my important documents".

When a disaster occurs, close neighbours are likely to be the first people on the scene to help the victims; to reach the affected locations' disaster response agencies needs time (Islam & Walkerden, 2014). These situations are sometimes worsened by the fact that access to locations is difficult, a lack of personnel and equipment, and limited information due to damage to communication infrastructure and facilities.

In Indonesia where the relationships among extended family, relatives, and surrounding neighbours are strong, neighbours are firstly and mainly the provider of assistance in the aftermath of a flood. Close relationships between extended family members and neighbours in Indonesia can be traced back to historical times where the culture of acting collectively has been part of the daily routine in community life. The cultural values within proverbs such as *mangan ora mangan kumpul* (togetherness receives higher priority than food), gotong royong (voluntary work), *musyawarah* (consensus building) are important for encouraging collective action and creating social harmony (*rukun*) in the community (Bowen, 1986; Chariri, 2009; Irawanto, Ramsey, & Ryan, 2011; Zaumseil et al., 2014).

After the floods receded, the local community cleared the debris in public facilities such as alleyways, paved roads, public schools, and religious buildings. According to a Wonosari Kelurahan official (Suratno), this required more than 1 week to clean up the affected areas of dirt. Another example of this kind of bonding (or social capital) was *tahlil*

(a prayer for the dead) and other religion-based social activities such as *pengajian* (a religious study gathering) and *selapanan* (a 35-day calendar cycle gathering) or jumpa bulan (a rotating monthly meeting). These activities serve as community self-help forums. One informant described *selapanan* as follows: "we have *selapanan kliwonan* which every household engages with. If any resident dies, the members of the *jamaah* (congregation) selapanan will prepare the necessary matters related to the death ceremonies. A Tahlil meeting, usually held on *malam jumat* (Thursday night), was used for the meeting with all neighbourhood unit (rukun tetangga) members. Besides praying for the dead, this meeting was also used to discuss several concerns in the unit; for example, activities related to the Independence Day celebration, an announcement about the gotong royong cleaning the sewer or to disseminate notifications from Kelurahan and higher government organisations. In this weekly meeting, every resident has to pay a subscription for social activities which were used to help any fellow community member who was sick or had died, or for contributions for other community needs; for instance, street light maintenance and the clean-up of debris after the flood.

In case members of the neighbourhood's unit did not join in these activities, they will not receive assistance (reciprocity principle) as one of RT chairman explained, "*nek ora nanem ora ngunduh*" (if you do not sow in spring you will not reap in autumn). Some people believed that there had been an increase in social ties among community members after the flood. In the words of one interviewee, "I am a newcomer here. In past times, there was differential treatment between original residents and new arrivals like me. But now we are all the same as community members".

8.6.2 The Role of Bridging Social Capital

There is rarely only one type of social capital found in a community. Bridging social capital is "connections between groups' networks" (Brondizio, Ostrom, & Young, 2009, p. 261).

Community participation in flood management was undertaken from nodal points. For example, as part of a mitigation strategy and to limit the risk, a flood early-warning system (FEWS) had been established (initiated by a local NGO, universities and municipal government agencies with the support of the Rockefeller Foundation) along the Bringin River engaging seven villages. This program relied on the riverbank dwellers voluntary work spreading information and warnings all inhabitants in hazardous locations. KSB members (a disaster preparedness group) living in the upstream sites were organised to inform their counterparts in downstream areas if heavy rainfall occurred; thus, the inhabitants of downstream areas could prepare for the risk of floods. These messages were usually spread through the short message service (SMS) of mobile phones. Previously, connections between KSB members in the seven villages was mainly through mobile phones because the HT (handy talky) provided by BPBD was perceived not to be effective. A key respondent who is a focal point for communication shared his concerns about this: "we just do not count the money spending on *pulsa* (the prepaid recharge mobile phone). This is for humanitarian reasons".

Some interview participants, the head of the KSB in Wates, Wonosari, and Mangunharjo, reported that they were informally organising the warning system by themselves; even the initiator was an external actor (a local NGO). Soon after receiving such warning from their counterpart upstream (in Wates), for example, by using the mosque loudspeaker, the head of KSB in Wonosari will announce to his neighbour to take precautionary actions. Some people who have a second floor usually begin to move their valuables and light things upstairs. For those who do not have a second storey, they move their belongings to nearby neighbours who are unaffected by flooding, or into temporary shelters in higher locations.

Interviewees spoke of the effectiveness of this warning alertness system. They built good relationships and communication with KSB members in the seven villages, the NGO staff, Kelurahan officials, and government agencies including the awareness to continue this practice after the project finished. The head of KSB interviewed felt that *silaturrahim* (mutual support) should be maintained even if the FEWS project had finished because the system had been well established; thus, community members can handle it by themselves.

There was also an initiative to establish a forum for a regular meeting. According to an informant in the upper basin: "to do that (have a regular meeting) we need a facilitator". These statements reflect a sense of helplessness without third party assistance. This is no surprise given the fact that the flood victims generally lack financial resources and knowledge. This finding differs from a previous study by Aßheuer et al. (2013, p. 29) in which bridging networks "play only a minor role at the micro-level". In the areas we observed, and for residents living in the vulnerable locations along Bringin River, bridging ties had an important role in managing flood risks.

8.6.3 The Role of Linking Social Capital

Besides bonding and bridging relationships, linking networks with governmental agencies (such as the Disaster Management Agency, the Water Resources Management Agency, the Local Development Planning Agency, the Environment Agency) and local parliament members were also observed in the *kampung*. Through the FEWS program, good communication and collaboration among KSBs and various government agencies had already established. These agencies included the Regional Disaster Management Agency (BPBD) for emergency response and recovery (providing logistical and technical support), the Meteorology, Climatology, and Geophysics Agency (BMKG) for dissemination of information on climate projection and the weather forecast, and the Indonesian Red Cross (PMI) for a post-event first aid response. Furthermore, the Water Resources Management Agency (PSDA) had assigned a budget for operational and maintenance costs of the ARR and AWLR system.

Informants reported that several forums had been created by communities and government to increase communication between stakeholders in the hazard-prone areas and government agencies such as Semargana (an abbreviation of Semarang Tanggap Bencana/Semarang disaster response), the FPRB (Forum Penanggulangan Risiko Bencana/ disaster risk reduction forum) and the KSB (Kelompok Siaga Bencana/ Disaster Preparedness Groups).

Through this forum, several RT chairman explained that they received training about disaster management and search-and-rescue operations. The relationship between government agencies such as the Disaster Management Agency, the Social Service Agency, and the Police Department was also good: "they often conducted dissemination and socialisation on disaster management together and they also established KSB as a communication forum among stakeholders" (Htn, Wates, Kelurahan official).

Additionally, there was a good relationship between those at the community level with local government agencies. A Kelurahan official explained that the Disaster Management Agency had provided tents for temporary shelter; they also helped to pave the road (Setiaji, Wates). Another KSB chairman also commented that the Disaster Management Agency provided life vests, ropes, generators, and HTs (handy talky) for communication between KSB members and the Disaster Management Agency.

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Linking networks with local parliament members were also reported by informants. Through *dana aspirasi* (an aspiration fund) legislators received a certain amount of funds from the state budget to be allocated to their constituents. An informant from Mangunharjo recognised that there was assistance from legislators to build a sluice in his neighbourhood while in Wonosari they provided assistance for paving a road.

Community-based organisational structures such as neighbourhood units (rukun tetangga) and community units (rukun warga) play a major role in establishing a connection with external actors. In this regard, the local neighbourhood leaders are the "gatekeepers" to conduct networking with local government agencies (Simone, 2010, p. 297). A similar situation has been observed in this kampung. Yuli, a local NGO worker, asserted: "key people and local leaders at a grassroots level such as *Kyai/Ulama* (Islamic scholars) and the head of RT/RW (the neighbourhood unit) were very important to build communication with external parties both governmental and non-governmental organisations. Through them, new initiatives and the program can be disseminated to all residents". Similarly, an informant in Wates stated: "suggestions from local leaders are still followed (by people)".

From the research discussed above, it is evident that social cohesion may serve as a reason for people to stay and create a perception that they can manage such hazardous events. This section has demonstrated adaptation strategies practiced by inhabitants along the Bringin River. There was government assistance for disaster preparedness and responses such as the FEWS program that had provided a bottom-up interaction among stakeholders and encouraged a community participatory process in disaster risk management. However, the local government was perceived as showing a lack of effective responses. The low trust regarding government capacities, competencies, and credibility to tackle floods has made communities find ways that can reduce the risk mainly through social networks. An interviewee, an RT official in Wonosari, argued: "with or without any government assistance, it was not a problem (for us) because our community is keen to work and cooperate harmoniously to manage these periodic flood hazards".

8.7 Conclusion

The case study presented in this chapter has examined coping strategies and adaptation practices of local communities after the 2010 flash flood in Bringin River, Semarang. This thesis has shown how flood-affected inhabitants responded to the deleterious effects of floods. The thesis found a range of solutions at a grassroots level that may influence villagers' abilities to cope with adverse impacts during and after flood hazards.

Semarang flood governance provides an example of coping and adaptation practices based on indigenous knowledge, cultural practices, and social connectedness. It emphasised that social capital is a key ingredient in creating a more resilient community in the lack of government assistance. The thesis demonstrates how the local community has made significant progress in coping with regular flooding through the support of family members and neighbours. With their low economic resources, it can be observed that they have been able to build effective risk-reduction mechanisms through various social activities such as gotong royong and tahlil. These community level initiatives are not only used as a forum for managing and anticipating future flood risks, but also for general neighbourhood purposes such as for the maintenance of street lights and the sewerage system. Increased solidarity between victims beyond the boundary of their village was noted as another positive consequence of environmental stresses. Hardships have contributed to the shared sense of social responsibility for ensuring the proper preparation for future disasters and build the strong bridging networks among local communities.

This thesis has also shown that even though bonding and bridging ties are crucial in ameliorating the impact of the lack of government efforts, the linking networks (the vertical relationship with local government for example) facilitated more meaningful coping strategies for flood-affected victims, particularly relating to planned adaptations such as infrastructure development that need more resources and good planning. Cooperation with third parties like NGOs, government agencies, and parliament members have been established to deal with the flood issues. These deliberate endeavours are taken to ensure that every family take necessary preparedness actions and can deal with uncertainties during crisis situations. The important role of both bonding and bridging capital during the initial stage of disaster events has been stressed. But to overcome the impacts of disaster in more comprehensive and more sustainable ways, the role of linking ties must not be neglected.

Chapter Nine: Conclusion

9.1 Introduction

This thesis investigated the mainstreaming of adaptation to climate change within development policy. The purpose of the research was is to identify effective mechanisms and instruments for mainstream adaptation into development planning in the context of a developing country. This chapter sets out the key findings of this thesis and highlights potential areas for future research.

9.2 Summary of Key Findings

The Indonesian government has recognised that adaptation is an important component of climate change policy, in addition to mitigation. Adaptation is an integral part of the development process for the country. Despite this recognition, implementing the adaptation agenda has proven complex – involving stakeholders operating at different scales, with different resources and different drivers. This section summarises the key findings in relation to the objectives of this thesis, based on a multi-level governance framework.

This thesis sought to identify the capacity gap between the existing governance arrangements supporting the mainstreaming of adaptation into development policy and what is ideally needed at the national level. It was found the designing process of the RAN API was top down with limited engagement of national level stakeholders and excluded from the local government. This lack of effective consultation resulted in a low ownership of RAN API, of it being poorly understood, and to difficulties in enforcement. Non-climate factors such governance and organisational issues seriously undermined the effectiveness of adaptation activities. Given that the literature review revealed that national involvement was critical to sustaining overall adaptation policies (Ayers et al., 2014; Dannevig et al., 2013; Wejs et al., 2014), the limitations caused by the top-down approach are problematic.

This thesis found that the role of the national government on adaptation in Indonesia could be further developed. Barriers to taking a stronger position in adaptation actions stem from the combination of four reasons:

• the absence of lead agency

- the lack of accurate and detailed data on recent and future climate scenarios
- no legal basis to policies, and
- finance and knowledge gaps.

In terms of the absence of the lead agency, adaptation literature has revealed that the presence of government institutions at a national level who work effectively is the key to increasing adaptive capacity. Without influential actors, policy coordination across the administrative level and across sectors became a big issue. The availability of climate data such as climate-related historical data, a vulnerability assessment, and future projections of climate change impacts, response options, and evaluation and priority systems is crucial before dealing with the adaptation. Without such reliable inputs, decision makers will face difficulties for formulating, implementing and monitoring adaptation related policies. The absence of a legal basis for mainstreaming adaptation has resulted in the absence of local adaptation plans and less enthusiasm to adopt adaptation programs. One implication of this has been the slow uptake of adaptation in local level development strategies. A lack of financial support from the central government to facilitate adaptation has also had significant implications. In addition, there was evidence of confusion regarding how the mainstreaming of adaptation into development policies could happen in practice and what kind of precondition was needed.

Given that the direct impacts of climate change manifest at the local level (Næss et al., 2005), the study considered how mainstreaming of adaptation to climate change manifested at the local level in the lack of a clear and resourced national adaptation program. The case study from the front runner in mainstreaming adaptation found that there was a range of challenges in mainstreaming adaptation into local agenda. This thesis identified that non-climatic variables such as governance issues were among the most serious constraints. This included a lack of understanding about adaptation, less synergy, and interaction among key stakeholders, limited human resources and no sense of obligation to develop an adaptation plan.

To address such problems, municipal officials employed several strategies including seeking access to external support (from donors, NGOs, and universities) and providing expertise and start-up funding. Informal communication and social learning through shadow organisation were also used to promote adaptation among line agencies.

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Examining these cases revealed that when national governments do not provide clear signals for the mainstreaming of adaptation to climate change in development policy, external actors (mainly international development partners) in cooperation with institutional entrepreneurs can have a critical supporting role. In particular, well-resourced international development partners can contribute through providing start-up funding for adaptation projects and expertise to guide the development and management of these.

After investigating the key governance issues (such as the limited incentives and weak national adaptation policy), the study investigated the factors underpinning the willingness of local governments to initiate adaptation. It was found that municipalities that had begun to mainstream adaptation to local development planning were driven by three key factors: (1) extreme weather experiences; (2) strong commitment from an elected leader and the existence of a policy entrepreneur, and; (3) external support. On the other hand, the findings of this thesis showed that the implementation of the mainstreaming effort was undermined by a number of factors. An important factor informing the delay in starting adaptation at the level of municipal government was a lack of understanding about the concept of mainstreaming adaptation. Other factors included lack of technical knowledge and the absence of an explicit mandate. This thesis found that a stronger, more developed approach from central government is required for ensuring adaptation is understood and adopted at the local or municipal level. Further, without an explicit mandate from central government, adaptation will be treated as a voluntary task thus receive little attention. This is because efforts to adapt to climate change have to compete with, arguably, the better understood and more pressing priorities of health and education.

Through the case studies, it was revealed that social capital had a critical relationship to the preparedness of local municipalities to mainstream adaptation to climate change within development policy. The thesis identified the importance of social ties (bonding, bridging, and linking social networks) in responding to climate hazards. The Semarang flood governance provided an example of coping and adaptation practices based on indigenous knowledge, cultural practices, and social connectedness. It revealed that social capital was a key ingredient in creating a more resilient community, particularly in the context of limited government assistance. The study demonstrated how the local community had made significant progress in coping with regular flooding through the support from family members and neighbours. Despite their low economic resources, it was observed that they had been able to build effective risk reduction mechanisms through various social activities.

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These community level initiatives were used as a forum for managing and anticipating future flood risks and also for general neighbourhood purposes. Increased solidarity between victims beyond the boundary village was identified as another positive consequence of environmental stresses. Hardships contributed to the shared sense of social responsibility for ensuring the proper preparation for future disasters and underpinned the development of strong bridging networks among local communities.

9.3 Implications

Implications from this research revealed two basic conditions to mainstream adaptation. First, to facilitate effective mainstreaming of adaptation, it is crucial to involve and engage all adaptation stakeholders in different levels (vertical linkage) from international, the national to the local level and inter-sector collaborations (horizontal network). Adaptation is a multi-level governance process and requires a collective action. Due to the multi-level nature of adaptation, in the case of Indonesia, the role of national government on adaptation is still limited and there remains a possibility for further improvement. One recommendation in this context is that there needs to be a clear mandate and incentives for local governments as they have done with mitigation programs. From the perspective of local governments, the existence of regulation can drive mainstreaming because government officials have a strong foundation for allocating budgets for adaptation-related activities.

Second, as a new policy area, the lack of understanding about the mainstreaming of adaptation to climate change into development policy requires special attention. This gap in knowledge was identified as a crucial issue in these case studies. The gaps in knowledge relate to climate information and also how to develop robust adaptation policy. Adaptation was identified as a relatively new concept for most of the stakeholders. Pragmatic options to enhance the understanding of practical know-how in integrating adaptation into the ongoing development is pivotal in this regard. In addition, scientific input for conducting vulnerability assessment, for instance, need to be emphasised. These activities should be conducted through cooperation with adaptation experts (researchers and academicians) that are largely going beyond local capacities. It is also important that the output is easily understood by local development planners.

9.4 Contribution of the Research

This research contributes to both scholars and policy makers in understanding the barriers, the drivers, possible solutions, and factors causing the delay in the mainstreaming of adaptation. This thesis thus contributes to the following aspects:

9.4.1 Theoretical Contribution

1. This thesis enriches to the body of knowledge about adaptation policy particularly on integrating climate change concerns into development policies. The findings in this thesis confirm the idea that at the early stage of mainstreaming like in Indonesia, a clear and stronger approach from the national level is critical to encourage the mainstreaming of adaptation at the municipal level (Dannevig et al., 2013; Rauken et al., 2015). The absence of national detailed adaptation strategy leads to the delay in local actions (Aall et al., 2012).

2. This thesis adds to a growing body of literature to identify strategies to overcome institutional barriers at the municipal level. The findings of the research revealed that to ensure the adoption of mainstreaming and the sustainability of adaptation decisions within local policy areas, the presence of political and administrative champions is a significant factor. This reinforces Tickell's argument (1997) that mayors can influence the development planner to put adaptation and environmental issues at the core of a city's policy. In addition, this thesis also finds that local champions play important roles in the pursuit of mainstreaming adaptation. This confirms the suggestion of the important role of administrative champions in adaptation agendas (Crow, 2010; Dannevig et al., 2012; Holgate, 2007; Kernaghan & da Silva, 2014; Pasquini et al., 2015; Wellstead & Stedman, 2015).

3. The findings of the research also contribute to identifying the motives for adaptation uptake in municipal level. Evidence from this research reinforced the issue identified in the literature on factors that contribute to the adoption of adaptation into policy planning – including climate variability and extreme weather events, economic and human resource availability, interaction with non-state actors (actors such as NGOs and universities), and forward-looking leadership. The reasons behind the willingness of local government to adopt mainstreaming have been highlighted in the literature (see Anguelovski et al., 2014; Cross, 2001; Koch, 2016; Lujala et al., 2015)

4. The findings of this thesis also contribute to an understanding of MLG theory. This theory offers explanations of complex phenomena in adaptation actions. As the impacts of climate change span multiple spatial scales, MLG theory plays an important role in understanding policy-making that involve a wide variety of actors and sectors and take place across multiple governance levels – local, national, regional and global Adaptation measures could be successful at one spatial (or temporal) scale but could become mal-adaptation at other spatial and temporal scale. A stand-alone adaptation action might also lessen its effectiveness due to limited resources and institutional constraints. In other words, MLG approach characterised by coordination and cooperation among different sectors and levels of government, donors, NGOs, and academics, provides more comprehensive analysis of adaptation policies and practices, compare to a single case study in a particular area.

9.4.2 Policy Contribution

This is a new study investigating the mainstreaming of adaptation that engaged a wide range of stakeholders from various backgrounds at national, municipal, and community level in Indonesia. It highlighted important issues and provided descriptions of the current progress of adaptation actions. Financing adaptation programmes are particularly important to be addressed. Recognising that climate change will pose a significant challenge and adaptation measures are difficult to attract private financing, it is important for government to integrate adaptation programmes into its development planning through public finance/budgetary systems. Allocating budgetary resources is a critical factor to translate adaptation policy into practices. Since 2014, Indonesian government has introduced budget tagging system to identify an expenditure item that is used to finance GHG emission reduction actions for seven key line ministries. This tagging system should also be applied for adaptation-related activities. Budget tagging can be used to monitor and tract the adaptation relevant spending in the national budget system. This tool is useful to examine the gap in funding to adaptation and hence can be used as a basis for the donors and international development partners to provide financial assistance. Moreover, using budget scoring system for adaptation measures can encourage government officers to incorporate adaptation into policy and planning.

9.4.3 Contribution to Practice

This thesis contributes to understanding how the local community is coping with regular environmental hazards. This thesis provides evidence that communities have been able to build effective risk reduction mechanisms through various social activities. Hardships have contributed to the shared sense of social responsibility for ensuring the proper preparation for future disasters and build the strong bridging networks among local communities. The important role of both bonding and bridging capitals during the initial stage of disaster events was stressed. To overcome the impacts of disasters in a more comprehensive and more sustainable way, the role of linking ties must not be neglected. These findings may encourage governments and other stakeholders to consider that indigenous knowledge, cultural practices, and social connectedness are critical for managing extreme environmental events in the future.

9.5 Further Studies

There remains a lack of clarity on how to align national and municipal adaptation agendas. This gap in knowledge about processes for vertical integration indicates the need for future research that will examine the governance arrangement for the effectiveness of mainstreaming adaptation. It is important to pinpoint the most suitable agency or ministry for blending the top down and bottom up approaches for increasing adaptive capacity in different contexts.

Another important area would be to evaluate the municipal commitment to mainstreaming adaptation and to see whether mainstreaming adaptation has been part of "business as usual" or not. It also could be interesting to explore the entry points that provide the better chance of success in local mainstreaming.

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Appendix 1 List of Interviews

National Level Key Infor	National Level Key Informants	
Tantri	MoE (G)	
Noeroso	MoF (G)	
Haryo	MoF (G)	
Budi Setiawan	RAN API Secretariat (G)	
Anindito	RAN API/GIZ consultant (DP)	
Idai	Bappenas/ICCTF (G)	
Amin	ICCTF (G)	
Heiner	GIZ (DP)	
Noguchi	JICA (DP)	
Budi Chairuddin	Mercycorp JKT (N)	
Petrus Nugro Rahardjo	BPPT (G)	
Arif Wibowo	MoE (G)	
Annisa	GIZ (DP)	
Maruo Picu	OECD (DP)	
Sukarno	Associations of City Governments (N)	
Tri Utari	associations of City Governments (N)	
Ari Muhammad	DNPI (G)	
Syurkani	MoF/PKPPIM (G)	
Hageng	MoF/PKPPIM (G)	
Singgih riphat	Researcher MoF (G)	
Hamzah Latief	ITB (A)	
Geofrey	UNDP (DP)	
Eyank Sofyan	MPBI (N)	
Rara	UNDP (DP)	
Perdinan	IPB (A)	

Local Level Key Informa	ants
LS1	Bappeda Semarang (G)
LS2	Environmental Protection Agency Semarang (G)
LS3	GIZ (DP)
LS4	Bintari (N)
LS5	ACCCRN/Mercycorp (N)
LS6	UNDIP (A)
Ismailiah	Bappeda Central Java Province (G)
Edi Waluyo	Bintari/BPBD (N/G)
Wiwandari	Undip (A)
Rukuh	Undip (A)
Toto	Environmental Protection Agency Temanggung (G)
Employee of Bappeda	Bappeda Temanggung (G)
Dione	Environmental Protection Agency Pekalongan (G)
Supriyanto	Environmental Protection Agency Pekalongan (G)
Hendar	Environmental Protection Agency Pekalongan (G)
Purnomo	Bappeda Pekalongan (G)
Edi Buntoro	Environmental Protection Agency Tegal Regency (G)
Yuli	Bintari (N)
Novan	Bintari (N)
Community Level Key Informants	
Mashuri	Kelurahan Official, Wonosari
Suratno	Kelurahan Official, Wonosari
Bu Amin	Informant, Wonosari
Bu Mar	Informant, Wonosari
Khaeruman	Local Leader, Wonosari
Pak Misoni	Elderly Informant, Wonosari
Pak hartono	Kelurahan Official, Wates
Pak Setiaji	Kelurahan Official, Wates
Imron	Local Leader, Mangun Harjo, Semarang
Faizin	Local Community Activist, Wates, Semarang

Bu Endang	Local Community Activist, Wonosari
Bu Umi	Local Informant, Wonosari 1
Agus	Local Community Activist, Kandang Panjang Pekalongan
Bu Agus	Local Community Activist, Kandang Panjang Pekalongan
Local Informant	Kandang Panjang Pekalongan
Head of RW Wonosari	Wonosari Semarang
Local Informant	Tapak Semarang
Fachruddin	Local Community Activist, Tapak Semarang

G=Government Body, A=Academics, N=NGO, DP=Development Partner

Appendix 2 Letter of Introduction



KEMENTERIAN KEUANGAN REPUBLIK INDONESIA BADAN KEBIJAKAN FISKAL PUSAT KEBIJAKAN PEMBIAYAAN PERUBAHAN IKLIM DAN MULTILATERAL

GEDUNG RADIUS PRAWIRO LANTAI 6, JALAN DR. WAHIDIN NOMOR 1, JAKARTA 10710 TELEPON (021) 34831678 FAKSIMILE (021) 34831677; SITUS www.fiskal.depkeu.go.id

Nomor: S-91/KF.6/2014 Lamp : Hal : Penelitian Lapangan

Kepada Bapak/Ibu di tempat

Dengan ini diberitahukan bahwa salah seorang peneliti di Pusat Kebijakan Pembiayaan Perubahan Iklim dan Multilateral (PKPPIM), Badan Kebijakan FIskal, Kementerian Keuangan yaitu Sdr. Arif Budi Rahman, NIP 197202161998031002, saat ini sedang melanjutkan studi S3 di Curtin University, Perth-Western Australia.

Guna memenuhi persyaratan untuk meraih gelar Philosophi Doctor (Ph.D), saat ini yang bersangkutan tengah melakukan penelitian untuk penulisan disertasi dengan judul "Climate Policy Integration: Creating an Effective National Framework for Climate Change Adaptation in Indonesia".

Sehubungan dengan hal tersebut, kami mohon kesediaan Bapak/Ibu untuk berkenan membantu kelancaran pelaksanaan penelitian dimaksud. Penelitian tersebut semata-mata untuk kepentingan akademik guna pengembangan keilmuan terutama terkait adaptasi perubahan iklim di Indonesia.

Atas perhatian dan bantuan Bapak/Ibu, diucapkan banyak terima kasih.

Kepala Pusat & Syurkani NIP 197108091996031001

Tembusan: Sekretaris BKF