EXPLORING ASSESSMENT OF FORMAL INSTITUTION IN FOSTERING COPING CAPACITY AND ADAPTIVE CAPACITY OF SOCIETY: THE CASE STUDY OF PADANG DISASTER RISK MANAGEMENT

MASTER THESIS
A thesis submitted in partial fulfillment of the requirements for the Master Degree from University of Groningen and the Master Degree from Institut Teknologi Bandung

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ABSTRACT

One of the leading debates between disaster risk reduction (DRR) and climate change adaptation (CCA) field of research is about integration between the two. There are growing global platform such as the Hyogo Framework for Actions became a milestone of integration between DRR and development policies. It indicates that adaptive capacity and coping capacity are getting equally desirable especially in coastal cities. Padang is an example of delta cities that is threatened by multiple-risks and yet it is already equipped with disaster management policies.

Role of institutions in fostering adaptive capacity from existing coping capacity has been discussed recently. Padang has been introduced with disaster management institution since 2005 and it has become a challenge for the governments to re-evaluate existing institutional capacity to be able to cope with and adapt to disaster risks uncertainty. Addressing the urgency of coping and adaptive capacity, this research undertakes the first attempt to assess the role of formal institution in fostering both capacities.

The new adaptive capacity and coping capacity wheel is developed and applied using formal DM institutions in Padang. Assessments were conducted using Qualitative Content Analysis method. From the three levels of DM institutions in Padang, national DM institution has the highest score for its consistency in implementing the HFA and concern about adaptive capacity. There are some distortions of criteria from national to local DM institutions. It shows failures of local actor in adopting reference from national level. Lastly, policy recommendations are synthesised in order to improve local DM institutions.

Keywords: *disaster risk reduction, formal institution, adaptive capacity wheel, coping capacity wheel, multi-hazards*

PREFACE

We have evidence throughout history that impacts of natural disaster events have been unbearable no matter how modern technology related to disaster-countermeasure owned by a country. Padang, capital city of West Sumatra province, is one of the examples of a city with multi-hazard risks. Since 2008, Padang has issued six local acts related to disaster management. Although local government formulate all the local acts, most of the policy contents are adopted from national policies as the main reference. Unfortunately, capacity of local actors and society in Padang is limited to emergency response phase. Adaptive capacity and coping capacity as a property of society are still poorly understood by local actors as well as society in general.

I have this concern for Padang since I have been working three years as civil servant in a spatial planning division and deal with Sumatera area in specific. Beside to fulfil the requirement of Master Degree, I primarily dedicate this study with all my heart for my country especially cities that are threatened by multi-hazards risks. People should not live in a deep fear of future uncertainty and thus, government should harness this opportunity to make formal institutions become more flexible and encouraging for society to cope with and adapt to future uncertainties. Hopefully, my knowledge and works contribute to Indonesia especially and also to other countries in general.

As my gratitude to the completion of this study, I would like to express my appreciation for all supports that makes it possible for me to finish this study. First of all, I would like to thank to Allah, God Almighty, who gives me strength I need to be able to finish this study. Secondly, I would like to give my appreciation to my supervisors, Dr. Margo van den Brink, Britta Restemeyer (RuG) and Dr. Denny Zulkaedi (ITB) for their time, patient and valuable feedback. I would also like to give my big appreciation to Bappenas and Nuffic Neso Indonesia for arranging this Scholarship and making it possible for me to study in ITB and RuG. I also give big appreciation to Prof. Johan Woltjer (RuG) for his support during the program. Special thanks to all my friends in Double Degree Program for their endless supports and unforgettable moments during this journey. Finally, I would like to give special honor to my family: my beloved husband Sigit Dwisadono, my mother and father, my sister and brother who give unconditional love and support to pursue my dreams. Thank you for all of the good things that I could never repay.

Groningen, August 2013

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ABBREVIATION LIST

AC : adaptive capacity
ACW : Adaptive Capacity Wheel
ADPC : Asian Disaster Preparedness Centre
AMCDDR : Asian Ministerial Conference on Disaster Risk
BPBD : *Badan Penanggulangan Bencana Daerah* (in English: Regional Disaster Management Agency)
DM : disaster management
DRR : disaster risk reduction
CC : coping capacity
CCA : climate change adaptation
CDC : Connecting Delta Cities
GAR : Global Assessment Report
HFA : Hyogo Framework for Actions
IPCC : Intergovernmental Panel on Climate Change
KODAL : *Komando Pengendali* (in English: Controlling Centre)
PFA : Priority for Actions
POSDAL : *Pos Pengendali* (in English: Controlling Post)
PPRR : prevention, preparedness, response and recovery
RPB : *Rencana Penanggulangan Bencana* (in English: Disaster Management Plan)

RTRW : *Rencana Tata Ruang Wilayah* (in English: Regional Spatial Plan)

PUSDALOPS-PB : *Pusat Pengendalian Operasi Penanggulangan Bencana* (in English: Controlling Operation Centre for Disaster Management)

RuG : Rijksuniversiteit Groningen

TRC : *Tim Reaksi Cepat* (in English: Fast Response Team)

UNISDR : United Nations International Strategy for Disaster Reduction

CHAPTER 1
INTRODUCTION

1.1. Background

Broad acceptance and understanding regarding climate change adaptation has not been properly related with disaster risk reduction context. **Figure 1.1** below illustrates global warming effect which causes global temperature rising in five continents. It informs that all continents experienced dramatic increase of temperature, especially North America, Europe, Africa and Asia. As a result, this change has severely affected many disaster prone areas in the world. Under more evident impacts of climate change dynamics in the past two decades, natural disaster events have been increased globally in terms of frequency. Global data series in **Figure 1.2** shows trend lines from different types of disasters. Natural disaster events that are triggered by climate change (hydro-meteorological hazards) such as flood and storm nearly quadrupled while non-climate change related disasters (geo-physical events) such as earthquake, tsunami, and volcanic eruption shows relatively stagnant number of occurrences. This figure implies that natural geo-disaster such as tectonic hazards (earthquake and tsunami) are slightly correlated with climate change symptoms.

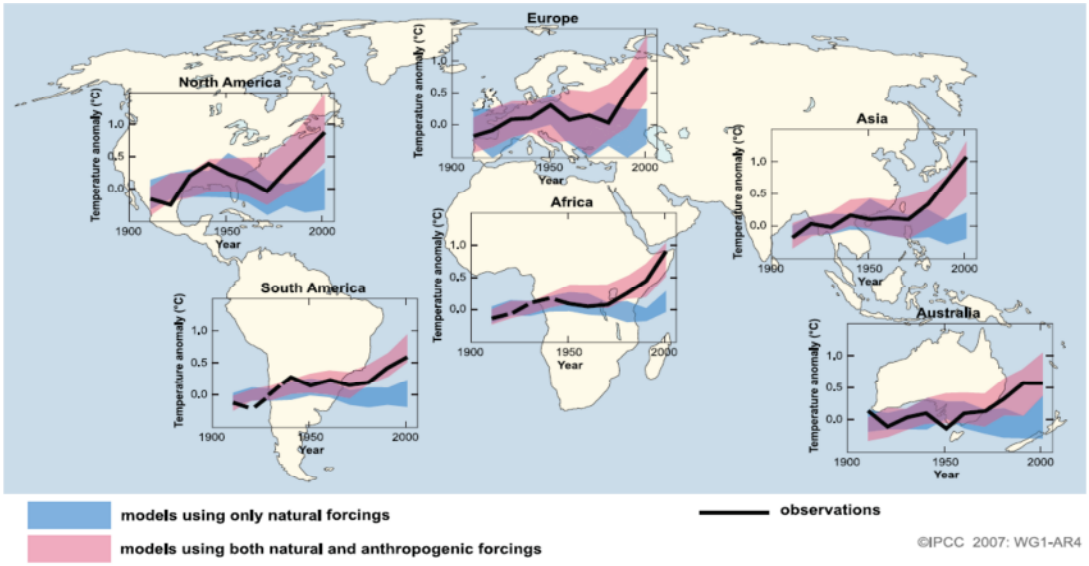

Figure 1.1 Continental Temperature Changes 1990 – 2000
(Source: IPCC in Hoepe, 2009)

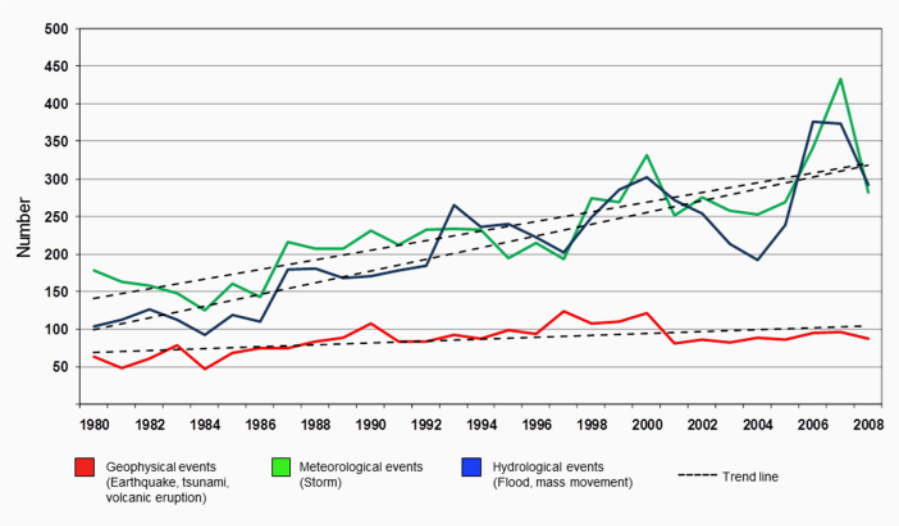

Figure 1.2 Global Natural Disasters 1980 – 2008
(Source: NatCatSERVICE in Hoepe, 2009)

Geo-hazards prone coastal cities become challenge in climate change adaptation (CCA) topic because it calls on Disaster Risk Reduction (DRR) approach for both climate related and non-climate related disasters. Most CCA scientist believed that disaster risk management topic is connected with CAA through case studies about weather-related disasters (Howes, et al., 2012) while non-weather-related disasters are often discussed separately. As an evidence, international initiative like the CDC (Connecting Delta Cities) emphasizes current global concern in creating flood-resilient coastal cities (www.deltacities.com) even though there many other delta cities that are threatened by geo-hazards. Although not all coastal or delta cities are threatened by interplay between different type of hazards, risks compound from both types of disaster exist especially in those located in tectonic plates boundaries (see **Figure 1.3**). These cities not only prone to storm and flood but also earthquake, tsunami and others subsequent impacts.

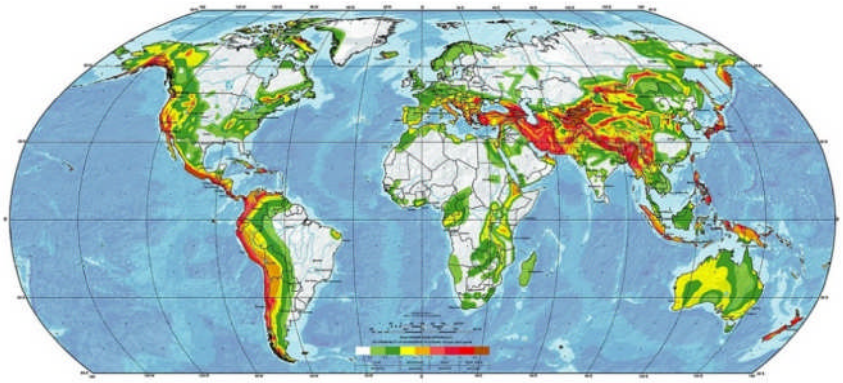

Figure 1.3 The global seismic hazard map (Source: Shedlock, et al., 2000)

In reality, certain geo-physical context determines risks characteristics especially for coastal cities that have bigger threats from geo-hazards. Before focusing on certain context of risk, geo-physical risk, a compilation of disasters presented in Yasuhara et al. (2012) shows a general categorization of disasters which potentially threat coastal cities (see **Figure 1.4**). Due to the fact that urban areas are characterized by a high population number, population density, and building coverage, the number of natural disaster victims in these areas is more likely to be higher than in non-urban areas. Asian Disaster Preparedness Centre reports that Asian cities are now at risk as 37% of Asia's population lived in cities by 2000 and this number will rise to 60% by 2025 (Arambepola & Rego, 2007). Furthermore the report shows that from the 10 largest Asian cities, 7 are prone to multi hazard risks and are waiting for a catastrophic event.

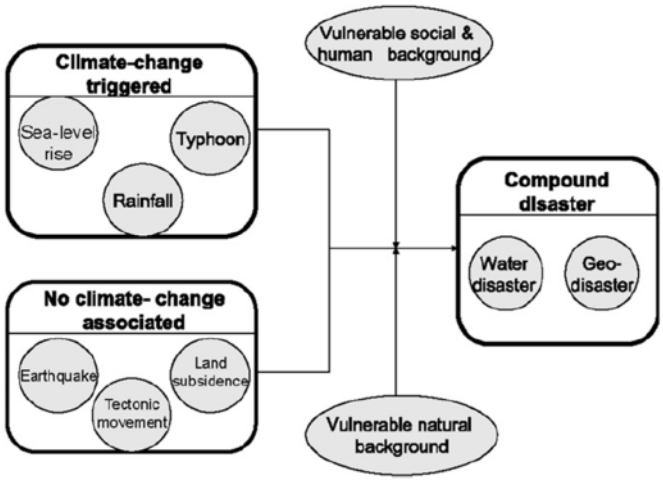

Figure 1.4 Disasters caused by overlapping of climate-change related and non-climate change related events (Source: Yasuhara, et al., 2012)

As an archipelago country located in joint of three continent plats (Eurasia, Indo-Australia and Pacific) and in the pacific ring of fire, Indonesia has become one of the most natural disaster prone countries in the world. Based on the number of people that are being at risk, this country is the most vulnerable for tsunami, landslide and volcano threats (BBC, 2011). Moreover, it has more than 13,000 islands and approximately 95,000 km coastal line (www.kkp.go.id). The Asian Ministerial Conference on Disaster Risk Reduction (AMCDDR) in 2010 released facts on the increasing impact of natural disasters in Asia (www.unisdr.org). Two of the most destructive earthquake events were in Padang municipality and Mentawai region in

2009 and 2010, respectively. As an extreme example, an earthquake event followed by a tsunami hit western the part of Sumatra Island (Aceh province) in December 2004 and claimed the lives of more than 170,000 people (www.acehpedia.org). The western part of Sumatra Island has the highest number of regions in the country (5 provinces) that are threatened by tsunami and earthquake hazards due to its geographical position. In conclusion, coastal cities that are threatened by climate change related and non-climate change related hazards offer new challenges for CCA field of research due to high impact uncertainties.

Current challenge in CCA is how society in geo-hazard prone cities can cope with and adapt to multi-hazard risk. The new challenge is relevant with new paradigm in disaster countermeasure namely the disaster risk reduction (DRR). Before DRR approach was being introduced as a new milestone, disaster countermeasure field used to be focused on vulnerability reduction. Long-standing practices of disaster vulnerability reduction using technical and short-term measures were mainstreamed in disaster practises and public policy arena (Solecki, et al., 2011). Coastal cities used to rely on technical measures to reduce probability of flood events by building physical barriers such as dikes as water or storm breaker through a project-oriented development plan. This approach was then increasingly improved by DRR approach which starts to consider long-term measures. Furthermore, disaster management (DM) policies have been legalised in many countries worldwide to guide DRR implementation. Under formal institutions, DRR measures are guided controlled and sometimes sequenced using disaster risk plans. Unfortunately, choosing strategies to deal with disaster risks often underestimate adaptation options because it is too difficult to implement (Thomalla, et al., 2006). The urgency of minimizing risks within exposed society requires the existing system to be able to change at any tipping points of development plan. It calls on flexibility in the way the social system is guided or and hence it calls for institutional change.

Historically, institutions were not established in the 19th century to answer complexity in environmental issues (Beck, 1992 in Howes, et al., 2012). Nonetheless, the integration of DRR in the institutional field has already been promoted by The United Nation (UN) through the Yokohama Strategy and Plan of Action for a Safer World since 1994. At this meeting, the UN promoted that nations should incorporate prevention, mitigation, preparedness, and relief in their development plans and

ensures efficient follow-up measures at the community, national, sub-regional, and international levels (Coppola, 2011). It also called for sub-regional, regional, and international cooperation to build up and strengthen human and institutional capacities. In January 2005, the UN held the World Conference on Disaster Reduction in Kobe, Japan (Coppola, 2011). At that time, one of the priorities for 2005–2015 has been to ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation. A similar statement has also been made with respect to CCA that adaptation to climate change is considered a wicked problem that calls for social and institutional process which become a matter of governance (Nieuwaal, Driessen, Spit, & Termeer, 2009). In addition, institutions may become hindrance in disaster risk management implementation (Howes, et al., 2012). Thus, people start to consider important role of formal institutions for building ability of society to cope with and adapt to dynamic interplay between multi-hazard riskss in coastal cities.

1.2. Research Urgencies

Terms of "adaptive capacity" and coping capacity" are important to be identified within DM institution context as first step to stimulate awareness of actors in public policy arena. Both terms which are the main keywords in this research used in academic research recently and not yet fully understood in practice. International DRR initiatives such as the Hyogo Framework for Actions (HFA) 2005-2015 is signed by 168 countries and becomes global precedence in integration of DRR measures in strategic development plans. Unfortunately, such viral influence in DRR practises is prematurely introduced to many local systems, especially cities or regions in developing countries where low intellectual capital and poverty becomes hindrance. Moreover, robustness of inherited property in formal institutions potentially obstruct society to implement adaptation strategies in response to climate change (Gupta, et al., 2010) as well as coping strategies in term of multi-hazard risk. Hence, providing self-assessment method for policy makers is necessary to make improvement or adjustment on formal institutions to be more flexible. Flexibility of DM institutions is believed as a way to stimulate and encourage adaptive capacity of society to cope with and adapt to uncertainties in future disaster and climate change impacts.

As expressed previously, the importance of acknowledging "coping capacity" and "adaptive capacity" is not yet fully equipped with a sufficient theoretical framework and assessment method. For example, Indonesia is one of the countries signed the HFA commitment has been implementing disaster management partially relative to its precedence, the HFA. One of local DM agencies in Indonesia has admitted in its local DM regulation that DRR implementation is still limited to emergency response due to limitation in institutional capacity. Moreover, modes of governance in Indonesia (decentralized multi-level governance) make the implementation of the HFA complicated. Three different levels of government potentially influence how the DRR predecessor (the HFA) is perceived and articulated in DM policies. Consequently, an assessment method for multi-level institutions context becomes a challenge for policy makers in dealing with numerous and potentially overlapped policies in one DM system.

1.3. Problem Statement, Research Objectives and Research Questions

The latest and most comprehensive assessment tool for adaptive institution is the "adaptive capacity wheel" (ACW) from Gupta et al. (2010). This assessment method is relatively new but it has become a milestone in adaptive capacity research by introducing the importance of adaptive institutions in fostering ability of society to adapt to climate change (Grothmann, et al., 2013). It is considered as a good example of a deductive assessment method which utilizes experts view or participatory judgement (Rouilard, 2012) and normative judgements (Klostermann, et al., 2010). Moreover, Grothmann et al. also stated that the ACW is the most applicable assessment method to assess adaptive institutions that can be used for various institutional settings. However, there are some critical points regarding the use of the ACW.

First critique is the less consideration of soft social aspect and motivational aspects (Grothmann, et al., 2013). This review concludes that the dimensions and criteria in the original ACW are not specific enough to identify which CCA measures are suitable to increase a dimension of adaptive capacity that has been identified as weaknesses. Furthermore, Klostermann et al. (2010) implies that some criteria such as trust, ability to discuss doubts and institutional memory are difficult to assess if

there is little information related to informal institutions of society (culture, local wisdom and other unwritten embedded values). Such criteria are easier to assess if researchers are familiar with the informal context that is inherited by the society. Consequently, it become an issue for policy makers or government officials who deal with many policy documents in different levels of government because it is more likely to be biased since some criteria are difficult to identify in policy documents.

Furthermore, the specific focus in this research, non-climate change related hazards, have a certain framework from DRR field of research which is developed apart from the CCA field of research. The framework is called the "disaster management cycle" (W. Nick, 2008). This is the latest and the most comprehensive framework of DRR because it comprises complete phases of pre-disaster, post-disaster and in-between phases (short term and long term measures). Apart from dimensions and criteria in the original ACW, this DRR framework becomes useful inputs to develop contextual dimensions and criteria for assessing disaster management institutions. Although, "adaptation" has been promoted as a DM strategy in some disaster-prone countries, it is still problematic for disaster practitioners and policy makers to identify "adaptive capacity" and "coping capacity" in a disaster management context.

Based on background and problem statements, there are two objectives of this research:

1. To explore and propose adjustment to the use of the original ACW regarding disaster risk reduction and multi-hazard context
2. To identify strengths, weaknesses and content gaps of disaster management policies in case study of Padang, a geo-disaster prone coastal city

To achieve the objectives there is a main research question underlying the content of the rest of chapters. ***What are the gaps in multi-level disaster management in Padang by assessing the role of formal institutions in stimulating adaptive capacity and strengthening coping capacity of society?***

In prior to answer the main question, this research has five sub questions to be answered orderly:

1. What are important dimensions and criteria of coping capacity and adaptive capacity to assess formal institutions in a disaster management context?
2. To what extent the reference of current disaster management policies in Padang reflects criteria of adaptive capacity and adaptive capacity?

3. To what extent do the formal disaster management from local, provincial and national level in Padang fulfil the criteria in fostering adaptive capacity and strengthening coping capacity of society?
4. Which content gaps can be identified and which policy recommendations can hence be derived for multi-level formal disaster management in Padang?

1.4. Research Strategy

According to background and problem statements, this research focuses on elaborating two fields of research which are DRR and CCA through an institutional assessment method. Exploring dimensions and criteria of "adaptive capacity" and "coping capacity" in DM context is the main challenge in this research which requires strategies. In general, there are three strategies applied to achieve research objectives:

1. Simplify adaptive capacity dimensions and criteria from the original ACW for formal institution context
2. Formulating a new wheel of coping capacity to incorporate DRR framework into the assessment method
3. Empirical analysis using policy documents from a relevant case study as primary data
4. Test the case study using a qualitative analysis software and expert judgement

Adaptive capacity dimensions and criteria selected in this research derived and inspired by reviewing the use of the original ACW (Gupta, et al., 2010), while coping capacity dimensions and criteria take insights from the disaster management cycle (W. Nick, 2008) which becomes one of the main reference in this research besides the ACW. Coping capacity is often related to ability to response occurring impacts from on-going disaster events. This general perception is relevant to cyclical phases in the disaster management cycle. This strategy implies five keywords of this research which are "disaster management policy", "assessment method", "coping capacity", and "adaptive capacity".

Contextual focus of this research on formal institutions inspires the new wheels to have fewer dimensions and criteria from the original ACW. Smaller wheels are

expected to minimize complexity in identifying statements for informal criteria. Therefore, policy documents are the suitable data to be assessed in this research. This strategy aims at the use of the new wheels by government officials using the most accessible formal institution data. By using selected policy documents, the application of the new assessment method is derived by identifying statements directly from the documents using content analysis. Importance of the wheels is to make first step in interpreting the quality of existing DM policies and to make practical policy recommendations.

In order to do empirical analysis, the scope of this research is limited to assess multi-level disaster management policies in a relevant DM case study. Padang is highly relevant for this research because it has a concerned reputation from mega-disaster threats which trigger many researchers to study the situation of this big coastal city. Besides many studies that are available related to this city, Padang is actually a unique coastal city that is located in the most unstable plates in Indonesia. Padang has intensive international influences regarding to implementation of DRR, while its DM policies are referred to national DM institutions in multi-level government setting. Using Padang as case study, multi-level DM policies which are related to Padang are assessed qualitatively and scored through similar protocol from Gupta et al, (2010). In addition, empirical context of this research also involves characteristic of earthquake risks and the HFA as reference in Padang.

1.5. Relevance of the Thesis

Scientifically, this study is relevant with policy analysis and environmental science which is categorized as environmental policy. Environmental governance becomes the glue of terminologies used in this thesis while environmental policy becomes the core theme of this thesis. CCA and DRR contexts discussed in this research are used as inputs for institutional reform from non-environmental oriented into environmental oriented institutions. In wider umbrella, adaptive institution itself is one of element to establish adaptive governance. Generally, this thesis is expected to contribute to strengthened theoretical framework of adaptive governance theories and bridge "vulnerability" and "resilience" perspective. This study is one of attempts to response complex environmental issues so that DRR or CCA is no longer

considered as options but as a synergy. Objectives of this thesis help orientate understanding of environmental policy researchers about interplay between CCA and DRR fields of research

From empirical perspective, assessing institutions in terms of adaptive capacity has challenged the way people perceive formal institutions as a robust structure to become more flexible. Moreover, disaster management policies provide guidance for society to be able to response disaster direct and indirect impacts. Societal relevance of this thesis can be seen from using disaster management in Padang as a case study. Characteristics of Padang represent context of this thesis which is geo-hazard prone coastal cities. Moreover, DM policies in Padang are established under multi-level government system in Indonesia which makes it more challenging to be assessed. Assessment of formal DM institutions in Padang sees society as object to be encouraged by institutional change. Institution as guidance of societal practise is assessed to give example on how to recognize "adaptive capacity" and "coping capacity" of society. This is a first step to stimulate awareness of disaster practitioners and policy makers in Padang especially and in similar context worldwide for making necessary adjustment in DM institutions.

1.6. Thesis Outline

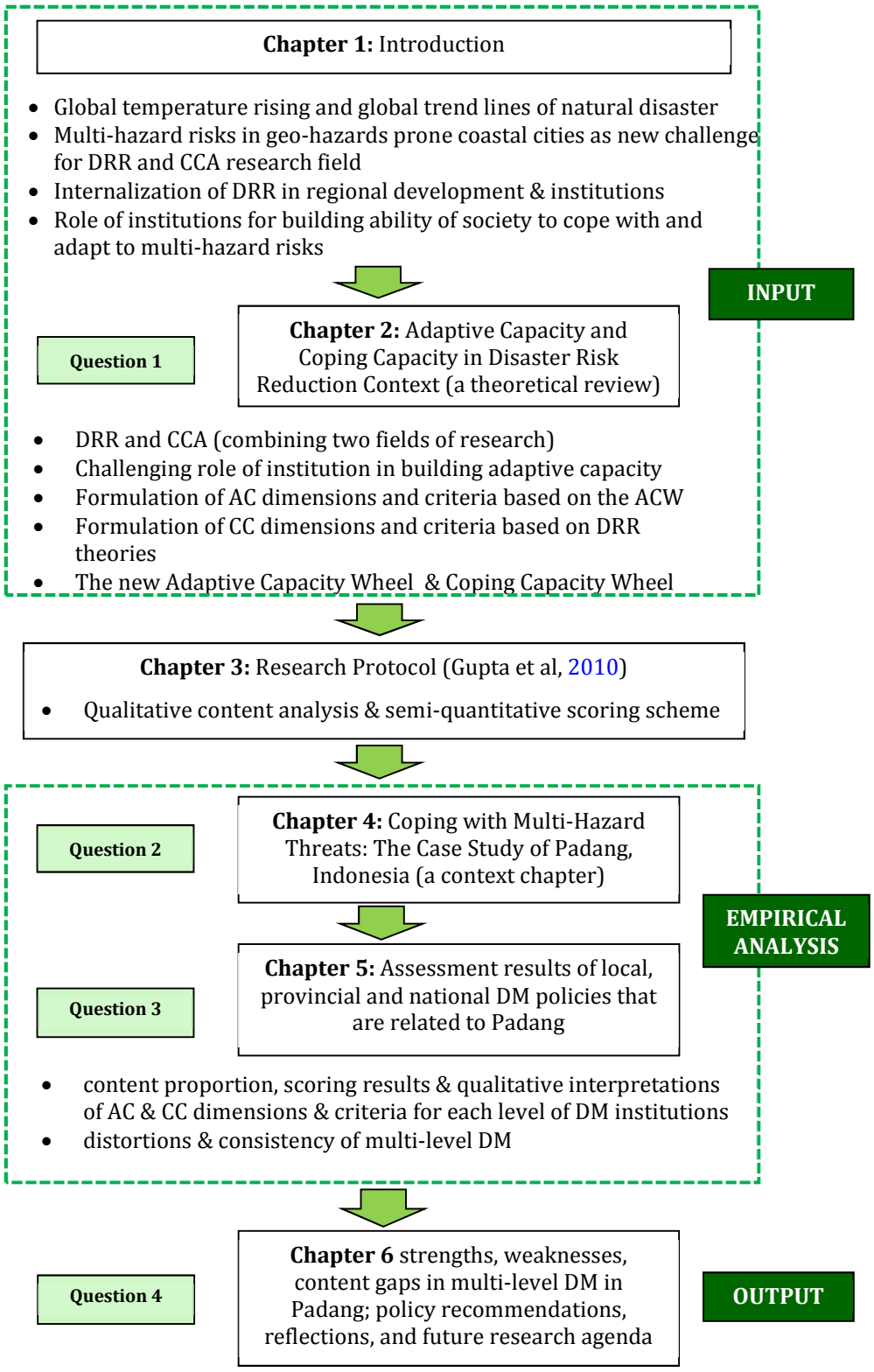

Figure 1.5 Thesis outline (Source: Author)

CHAPTER 2
EXPLORING COPING CAPACITY AND ADAPTIVE CAPACITY IN DISASTER RISK REDUCTION CONTEXT

2.1. Adaptive Capacity and Coping Capacity in Disaster Risk Reduction and Climate Change Adaptation Context

There is a growing awareness that we are now living in a more complex environment. A city – with its agglomeration and major functional roles – is probably the most exposed example of a complex system that requires certain properties to be able to cope with and anticipate internal or external perturbations. A city is represented by local governments and most importantly, the society. Vulnerability of a system, such as a city, is often associated with social capital which is represented either by coping capacity (CC) or adaptive capacity (AC). For example, vulnerability presented in a framework from Birkmann (2006 in Taubenbock, et al., 2009) shows coping capacity position in the context of natural hazard.

Risk = f (hazard, vulnerability)

Vulnerability = f (exposed elements, susceptibility, coping capacity)

Next function by Adger (2005), Alberini, et al. (2006) and Engle (2011) shows adaptive capacity as one of vulnerability determinants in context of climate change. It explains that sensitivity and exposure are determinants for adaptive capacity.

Vulnerability = f (exposure, sensitivity, adaptive capacity)

The difference between the two functions is social capital which are different type of social capacity (cope and adapt) to be assessed in order to recognize vulnerability of a system. These functions represent the two major backgrounds mentioned in the previous chapter. Furthermore, both capacities are usually differentiated using temporal signposting which acknowledges coping capacity through current actions (short-term measures) and adaptive capacity through future anticipation or long-term measures (Solecki, et al., 2011 & Berman, et al., 2012).

Figure 2.1 shows distinction between notions CCA and DRR field of research. Thomalla et al. (2006) make general distinction of CCA and DRR characteristics

based perceptions from both research communities. In terms of approach, they concluded that DRR has focused on engineering-based measures, while CCA has emphasized on adaptation approach. Coping and adaptation are hence recognized as options which building adaptive capacity of society becomes strategies for CCA. Meanwhile, impact reductions strategies through disaster preparedness and response are associated with DRR.

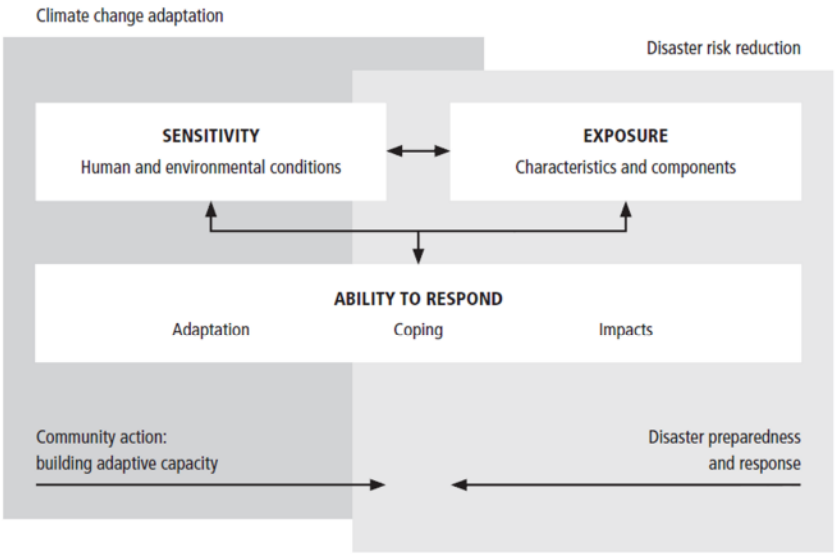

Figure 2.1 Traditional conceptual and operational notions of the climate change adaptation and disaster risk management field of research (Thomalla, et al. 2006)

According to current perceptions within DRR and CCA communities, it seems that fragmentation between DRR and CCA topic is clear in the surface. Especially, scholars and practitioners that are focuses on DRR do not contribute their concern on climate change debates (Helmer & Hilhorst, 2006). It is shown by differentiation between studies about DRR and CCA. I noticed that there are at least two major backgrounds of the two fields of research:

1. Context of empirical cases.

It is common sense that chosen references – either "DRR" or "CCA" – is always context-related. For example, a system that is exposed to natural disasters gives more focus on vulnerability reduction due to its sudden-catastrophic impacts by tackling the sources of vulnerability (Solecki, et al., 2011). On the other hand, a system that is gradually influenced by sea level rise, increasing temperature or other extreme climate behaviour gives more focus on developing new solutions or make adjustment (Thomalla, et al., 2006). Therefore, paradox between DRR

and CCA approach is represented by dilemma in choosing between "defensive" and "adaptive" strategy, between "robust" and "flexible", and so forth.

2. Individual perception of reality

According to Davoudi (2012), the discourses about how people perceive vulnerability and resilience are based on individual perception. Disaster response is a long known research field which is characterized by providing technological solutions (Helmer, et al., 2006). Disaster practitioners are more likely have faith in DRR measures as remedies rather than adjusting their current system to be able to adapt with autonomous events. It suggests that people sees reality as almost linear (Thomalla, et al., 2006) and that they pursue vulnerability reduction and system stability as the end goals. Davoudi then defined this view as "engineering" or "ecological" perspective. On the other hand, CCA scientists see reality as dynamic and complex, thus it sees disturbances as windows of opportunity for a system to increase its ability to survive.

These backgrounds suggest that there are actually no wrong, right, or prescriptions in deciding each own "survival strategies" as long as individuals are fully aware and able to recognize their empirical context and how they want to perceive reality. Nonetheless, both perspectives do raise important questions for this research as mentioned in the previous chapter, is there any chance for a system to elaborate both perspective in the context of DRR and CCA, such as geo-disaster prone coastal cities? A city that is influenced by both climate change and non-climate change related hazards (Yasuhara, et al., 2012).

In conclusion, this research defines "coping capacity" as the "cures" while adaptive capacity as the "willingness to change". Coping capacity focuses on vulnerability reduction, while adaptive capacity aimed at windows of opportunities through continuous learning and adjusting. Coping capacity in this research is ability of society to perform certain disaster countermeasure approach to reduce vulnerability, thus society may have more than one coping capacities. Furthermore, definitions of adaptive capacity in terms of disaster risks management are:

1. Ability of society to acknowledge transboundary and divergent adaptation options and other properties. It has relevant keywords such as *multi-level, multi-actors, multi-discipline, multi-hazard, multi-scale, multi-scope, multi-interpretation*, and so forth

2. Ability of society to frame & improve adaptation options. It involves "*didactic*" aspects or "learn how to learn" such as *experiment, initiative, curiosity, exploring tacit knowledge, technology, innovation, creativity, iteration process, self-assessment*, and so forth
3. Ability of society to transform or adjust adaptation options. This is the most important which I refer as the core of "the willingness". Although it is abstract and difficult to recognize, *transformability* and *flexibility* of the system is important to recognize and pursue so that learning process can easily take place in adjustment process.

2.2. Challenging Role of Institution in Building Adaptive Capacity on Coping Capacity

Institution is defined as humanly created formal and informal mechanisms that shape social and individual expectations, interactions, and behaviour (Ostrom 1990, North 1990, Bates 1981 cited in Agrawal, 2008). Later on, institutions were more perceived as rules, procedures and norms which define roles, rights, responsibilities and guide social practices of different actors (Ostrom 2005; Young 2002). Institutions structure and shape outcomes through the actions of individuals and decision makers associated with them. Therefore, recent studies emphasize the need for more comprehensive institutional analysis and emphasis on continued institutional support and articulation (Upton, 2012). The difficulties in fulfilling such research agenda is that the existing institutional set-up is not only complex, confusing and sectoral, fragmented (Torell, 1999), but also inhibits characteristics that resist changes (Gupta, et al., 2010). Based on central focus of this research on DRR context, these institution characteristics call for positioning disaster management institutions within DRR and CCA context as already framed in a research by Berman et al. (2012).

Berman et al. (2012) in their adaptive capacity research through rural community case raise fundamental questions that open the gate for this research as follows

1. *What are the gaps between coping and adaptation strategies?*
2. *Is it possible to build adaptive capacity on coping capacity?*

Figure 2.2 is an interesting and useful framework to explain the potential influence of institutions (formal or informal) in either transforming or blocking coping capacity into adaptive capacity in terms of building a resilient community. This concept is relevant to this research because this research aim at assessing DM formal institution in terms of coping and adaptive capacity.

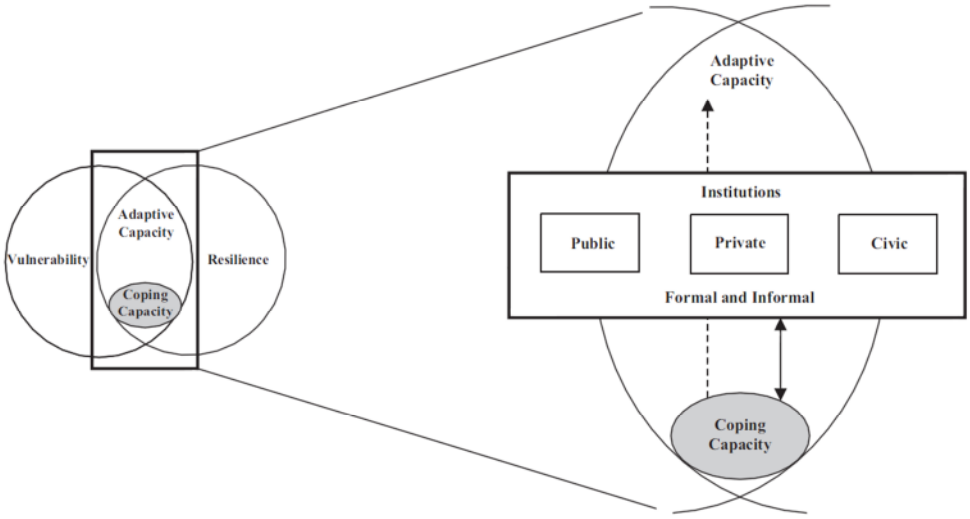

Figure 2.2 Transformation of coping capacity to adaptive capacity
(Source: Berman et al., 2012)

Although these questions are quite new and still need more research agenda to be done, they suggest important remarks, as follow:

1. Due to their robustness, institutions (formal or informal) become constrains that block society from transforming existing coping strategies into sustainable adaptation strategies (see **Figure 2.2**). Therefore, it implies the importance of "adaptive institution" as bridge between the two capacities within society as well as bridge between vulnerability and resilience approaches. It is expected that "adaptive institution" represents wider problem frames which can be a remedy to overcome high transaction costs (Pahl-Wostl, 2009) in establishing new institutions along the dynamic process.
2. Trade-offs between coping capacity and adaptive capacity could be one of the major consequences in attempts to integrate both capacities. For example, when actors in a system decide to perform adaptation strategy by replacing their blue print plans with more flexible way of planning, therefore society may have to trade-off their degree of certainty in some land use in order to gain more room and opportunity for autonomous needs. For example, the World Risk Report

(2011) stated that coping capacity may no longer necessary when society already perform adaptation in the first place. However, it does not imply that both capacities cannot be required at the same time. Therefore, knowing differences between the two is essential.

Berman et al. (2012) ask questions whether adaptive capacity can be built on coping capacity. Thus, it is necessary that t coping capacity and adaptive capacity can be differentiated in concrete way. Using **Figure 2.2**, this research orientates coping capacities as different properties which are part of the adaptive capacity. To make it clear, I made **Figure 2.3** to zoom in the property of adaptive capacities. Here, different kind of coping capacities that owned by a system helps to strengthen adaptive capacity by providing different capacities to alter whenever change in hazard pattern occurs and adjustment is required. A disaster risk reduction framework for one type of disaster as well as combination of several hazards then can be considered as a coping capacity. Thus, number of coping capacities owned by a system can be seen from variety of disasters and their combinations that are acknowledged in one DM.

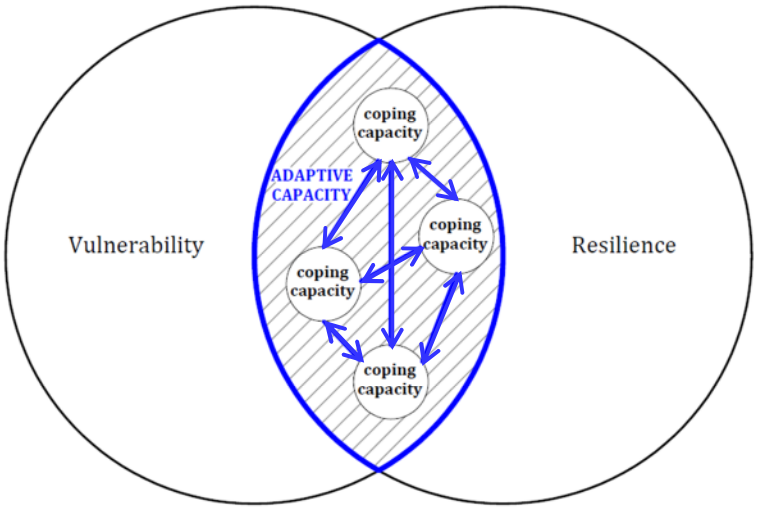

Figure 2.3 Coping capacities and its transformability as properties of adaptive capacity (Source: Author)

2.3. Formulating Dimensions and Criteria for Adaptive Capacity through the Adaptive Capacity Wheel

There are some terminologies that have close relation with adaptive capacity such as exposure, sensitivity, resilience, vulnerability and coping capacity (Smit & Wandel, 2006). Climate hazards such as floods and droughts have traditionally been addressed through disaster risk management and coping strategies, while adjusting to climate changes such as change precipitation, temperature and sea level rising has been the domain of adaptation (Agrawal, 2008 in Berman, et al., 2012). For adaptive capacity assessment, a complete and comprehensive framework for assessing adaptive capacity of institutions is the "*Adaptive Capacity Wheel*" introduced by Gupta and her colleagues in 2010. The wheel helps academics and social actors to assess whether institutions stimulates, constraints or gives no influence to adaptive capacity of society in terms of climate change. Therefore, it may require institutional redesign in each or multi-scalar governance to accommodate dimensions and criteria of adaptive capacity. It is supported by arguments that policies for adaptation to climate change should be designed on a local scale as well as national scale (Yoo, 2011).

The wheel consists of three key dimensions and three supporting dimensions (see **Table 2.1**). These dimensions are assessed in single wheel with the scoring property and traffic light colour system for each layer (criteria, dimensions and finally total score of adaptive capacity). Key dimensions of the ACW are "variety", "learning capacity", and "room for autonomous change". These three key dimensions are closely related to criteria that enable society to change current system according to unexpected changes in the future due to climate change. These dimensions emphasize independency, creativity and partnership as base principles, thus it is considered as adaptive capacity dimensions and criteria in this research with some adjustment in the criteria. Furthermore, there are three other dimensions in the original ACW that are considered as supporting aspects and not directly related with ability to perform adaptation compared to the key dimensions. These dimensions are "leadership", "resources" and "fair governance".

Table 2.1 The original adaptive capacity dimensions and criteria (Source: Gupta, et al. 2010)

No.	Dimension	Criteria	Definition
KEY DIMENSIONS			
1.	Variety	Variety of problem frames	Room for multiple frames of references, opinions and problem definitions
		Multi-actor, multi-level, multi-sector	Involvement of different actors, levels and sectors in the governance process
		Diversity of solutions	Availability of a wide range of different policy options to tackle a problem
		Redundancy (duplication)	Presence of overlapping measures and back-up systems; not cost-effective
2.	Learning capacity	Trust	Presence of institutional patterns that promote mutual respect and trust
		Single loop learning	Ability of institutional patterns to learn from past experiences and improve their routines
		Double loop learning	Evidence of changes in assumptions underlying institutional patterns
		Discuss doubts	Institutional openness towards uncertainties
		Institutional memory	Institutional provision of monitoring and evaluation processes of policy experiences
3.	Room for autonomous change	Continuous access to information	Accessibility of data within institutional memory and early warning systems to individuals
		Act according to plan	Increasing the ability of individuals to act by providing plans and scripts for action, especially in case of disasters
		Capacity to improvise	Increasing the capacity of individuals to self-organize and innovate; foster social capital
SUPPORTING DIMENSIONS			
4.	Leadership	Visionary	Room for long-term visions and reformist leaders
		Entrepreneurial	Room for leaders that stimulate actions and undertakings; leadership by example
		Collaborative	Room for leaders who encourage collaboration between different actors; adaptive co-management
5.	Resources	Authority	Provision of accepted or legitimate forms of power; whether or not institutional rules are embedded in constitutional laws
		Human resources	Availability of expertise, knowledge and human labour
		Financial resources	Availability of financial resources to support policy measures and financial incentives
6.	Fair governance	Legitimacy	Whether there is public support for a specific institution
		Equity	Whether or not institutional rules are fair
		Responsiveness	Whether or not institutional patterns show response to society
		Accountability	Whether or not institutional patterns provide accountability procedures

The use of the wheel involves qualitative judgement and semi-quantitative scoring scheme. Assessment of the dimensions and criteria is actually targeted at climate change context which focuses in four sectors namely water, agriculture, nature, and spatial planning. Thus, in specific context like DRR and formal institutions, it seems

difficult to differentiate DRR measures and approach to adaptation options using one wheel. Many researchers agree that it would be useful to produce indicators of adaptive capacity for the purpose of understanding its determinants and prioritizing interventions (Adger and Vincent, 2005; Haddad, 2005, cited in Alberini, et al. 2006). Therefore, the ACW needs to be adjusted for the specific context of this research. Due to importance of understanding "coping capacity" and "adaptive capacity" for policy makers and disaster practitioners, I propose for a separate AC wheel and a CC wheel explained in the remainder of this chapter.

Figure 2.4 The Adaptive Capacity Wheel (Source: Gupta et al., 2010)

Comparing with the actual ACW, the new adaptive capacity wheel incorporates the three key dimensions which are "variety of adaptive", "learning capacity" and "room for autonomous change". Consequently, there are some adjustments in criteria and definitions according to the focus of this research on assessing formal institutions. Moreover, supporting dimensions are no longer used in the new ACW due to consideration of coping capacity dimensions that are more relevant with the three supporting dimensions in the original ACW. Besides, "leadership" and "fair

governance" criteria are relatively difficult to identify it in policy documents. As explained in the introduction, this research also aim at providing practical method for government officers and other local actors to assess and give recommendation for formal institutions improvements. Nonetheless, "resources" is potentially selected as "coping capacity" dimensions due to close relevancy with direct response to disaster occurrence. **Figure 2.5, 2.6 and 2.7** show formulation of selected criteria for context of this research.

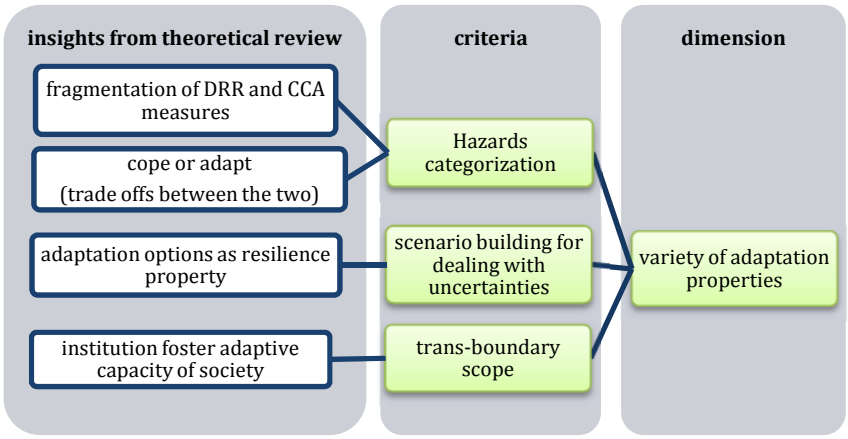

Figure 2.5 Formulation of "variety of adaptation properties" as adaptive capacity dimension (Source: Author)

Dimension 1: Variety of adaptation properties

Variety in the original ACW consists of four criteria (variety of problem frames, multi-actor, multi-level, multi-sector, diversity of solutions, and redundancy/duplication). I propose to reduce and rephrase the criteria to be closer to disaster management context. Variety of problem frames in original one does not explicitly refer to problems that underlie wider scope of strategic approaches. For example, in disaster management context there are problem scope of direct or indirect problem as well as short term and long term problems.

Variety of problems in emergency measures is irrelevant to represent sufficient problem scopes in adaptive capacity. It may happen in assessment practise if the researcher is not fully aware of the context. For example, mentioning various problems caused by one type of disaster does not relevant to the variety of hazards combinations that are expected to be understood by society. Therefore, in this opportunity, I adjust "problem variety" criteria to be called as "hazards

categorization", preferably refer to category by Adger et al. (2004). "Scenario building for dealing with uncertainties" is built based on the same consideration. It is related to extreme scenarios based on different kind of uncertainties (Lawrence, 1995 & Wulf et al., 2010). Scenario logics (Wilkinson, 1995 & Wulf et. al., 2010) are example of appropriate scenario building for DRR context. Finally, "trans-boundary scopes" is quite the same with criteria in original ACW namely "multi-level, multi-actors, multi-sector".

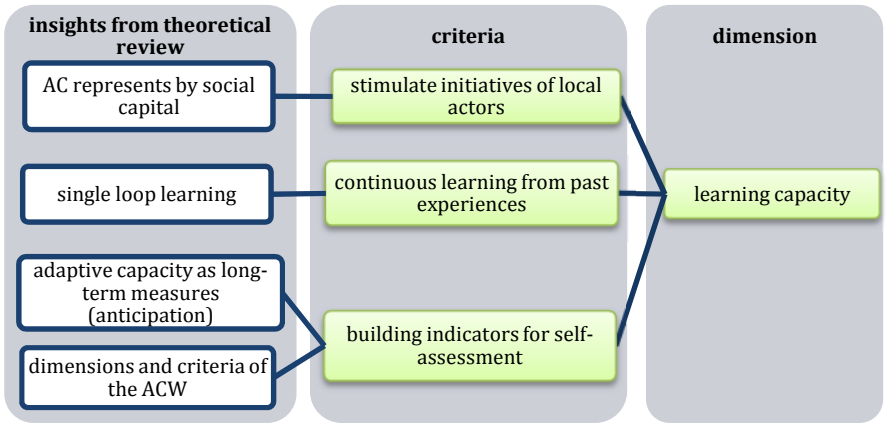

Figure 2.6 Formulation of "learning capacity" as adaptive capacity dimension (Source: Author)

Dimension 2: Learning Capacity

"Learning capacity" is one of the key dimensions in the original ACW. However, the three criteria mentioned in the dimension are quite abstract and complex to be assessed in terms of formal institution. For example, "trust", "discuss doubts", and "institutional memory" are hardly assessable through analysis of formal policy documents. Moreover, "single and double loop learning" is also a difficult term to be translated to a concrete example. Thus, I propose three new criteria of "learning capacity" dimension which are relevant to assess learning capacity in DRR context.

First, "stimulate initiatives of local actors" is relevant with the notion of adaptive capacity as the "willingness to change". Similarly, the term "stimulate initiatives of local actors" also relevant with knowledge transfer and empowerment to society. The second criterion is also significant for fostering learning capacity of society. "Continuous learning from past experiences" is something that is really hard to find in the policy documents. One way is to mention about relevant studies and

evaluation which is closely relevant with this criterion. Lastly, the original ACW sees the importance of learning capacity of society through "single-loop" and "double-loop" learning capacity. However, there are no criteria to build indicators for local actors to do self-assessment in the original ACW. In evaluating implementation of adaptation strategies, indicators for self-assessment need to be built to set minimum knowledge level of DRR in each level of government.

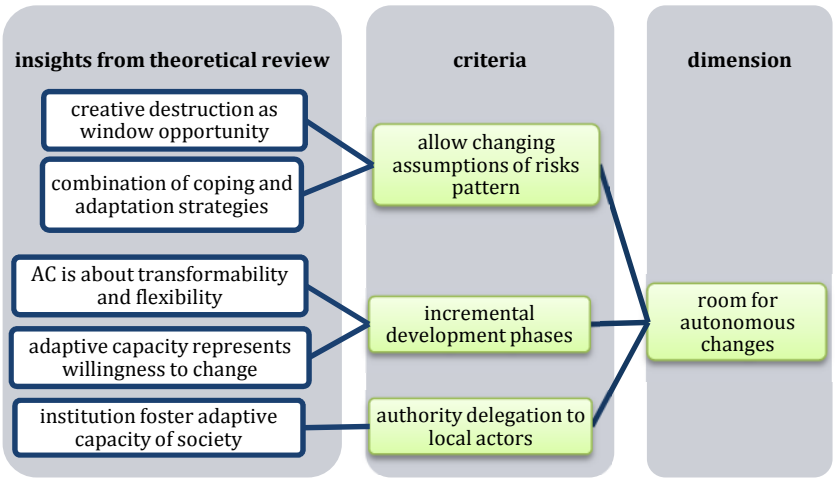

Figure 2.7 Formulation of "room for autonomous changes" as adaptive capacity dimension (Source: Author)

Dimension 3: Room for autonomous change

Room for autonomous change in the original ACW consists of continuous access to information, act according to plan and capacity to improvise. In my adjustment into coping capacity and adaptive capacity, these criteria are more relevant to represent coping capacity notions because it directly used in performing DRR strategies and indirectly influence the willingness to adapt (transformability). Therefore, I propose three new criteria for this dimension (see **Figure 2.7**).

First criterion is "allow changing assumption of risks pattern". This criterion is actually inspired by "double-loop learning" criteria in the original ACW. The original criterion is no longer used because of broad terminology that may result in multi-interpretation during assessment. "Double loop learning" refers to institutional pattern in that show that institutions allow changing assumptions. However, setting the context of assumption is necessary to avoid unspecified adjustment. An example, changing assumption in term of earthquake probability does not fulfil the variety requires in a multi-hazard prone areas. Hazards are changing in pattern and it can

also happen any time with increasing frequency and combined impacts. Therefore, changing risks combination between earthquake and sea level rise is more appropriate to represents variety in adaptive capacity.

The next two criteria are also relevant in providing opportunity to change through incremental planning and implementation as well as power delegation to local actors. In order to accommodate flexibility of institutions in facilitating society with room for change, a comprehensive rational planning method is not appropriate for multi-hazard context. Instead, planning in this context requires combination of technical approach, experiences, and intuition in less-robust procedures (Larsen 2003 in www.geo.fu-berlin.de). Therefore, incremental rationality in planning approach is considered as the best approach in context of this research. In the assessment, availability of "incremental development phases" as a response to multi-hazard risks add positive value to DM institutions regarding the adaptive capacity.

The last criterion represents some criteria in the original ACW which are "collaborative" and "trust". Therefore, I do not include leadership dimension in because some criteria like "visionary leadership", "entrepreneurial leadership", and "trust" are quite hard to identify literally within policy document. In the new ACW, it modified into "authority delegation to local actors". It is important to emphasize that delegation to local actors is the most critical in building adaptive capacity rather than delegation to national delegation to province or only to local officials. To summarize, **Table 2.2** provide descriptions of dimensions and criteria of adaptive capacity that is selected and formulated for this research.

Table 2.2 New adaptive capacity dimensions and criteria (Source: Author)

No.	Dimension	No.	Criteria	Inspiration	Example
1.	Variety of adaptation properties	1	hazards categorization	Nick (2008); Boin (2009); Gupta et al (2010): Adger et al. (2004)	Discrete recurrent/ discrete singular/ continuous hazards ; consideration of short-term and long-term multiplier effects; natural, man-made or complex disasters; moderate to complex problems; and so forth
		2	scenario building for dealing with uncertainties	Nick (2008); Wilkinson (1995); Wulf, et al. (2010)	Scenario building matrix based on keys of uncertainties; worst case scenario building; and others

No.	Dimension	No.	Criteria	Inspiration	Example
		3	Trans-boundary scope (multi-sector, multi-level, multi-discipline, multi-actor)	Folke et al (2005); Gupta et al (2010); Van der Vlist (2013)	Partnership between private party, public and government sectors, Joint action committee between national, province and local government; integrating disaster management in all sectors
2.	Learning Capacity	1	stimulate initiatives of local actors	Martin & Simmie (2008)	Government funds a neighbourhood or a village that shows efforts in implementing new way of communal preparation for tsunami risks
		2	continuous learning from past experiences	Gupta et al (2010);	review of policy evaluation studies in public decision-making
		3	building indicators for self-assessment	Gupta et al (2010); Engle (2011)	assessment guideline for to assess consistency of DRR or scenario implementation within different level of government
3.	Room for autonomous changes	1	allow changing assumption of risks pattern	Gupta et al (2010); Innes & Booher (2010)	Allow either technical or non-technical consideration to immediately decide between reconstruction or relocation
		2	incremental development phases	Haasnoot et al (2013); Rauws (2012); Van der Vlist (2013)	Sequencing scheme of alternatives of 5 year step-by-step programs within 20 years development plan and based on certain
		3	authority delegation to local actors	Gupta et al (2010);	local disaster management agency of Padang is authorized to decide DRR or adaptation strategies
	TOTAL	**9**			

2.4. Formulating Dimensions and Criteria for Coping Capacity through the Disaster Management Cycle

This research suggests that there are three basic elements from the DRR approach to identify coping capacity of society which are “awareness”, “structures”, and “resources”. To start with, broad acceptance and understanding about “coping capacity” has been closely associated with ability to response and recover from immediate impacts of a disaster occurrence (Berman, et al., 2012). Definition of “coping capacity” from Adger et al., (2004) is probably the most representative in showing its relation with adaptive capacity. He stated that “coping capacity” is one aspect of the adaptive capacity and inversely related to vulnerability. This statement support definition in this research that “coping capacity” is a property of “adaptive capacity” and it provide a set of options to be selected, combined or adjusted according to any urgency. Considering the context of this research, I propose dimensions and criteria into a coping capacity wheel for these several urgencies:

1. Accommodate and orientate DRR context in "adaptive capacity" assessment
2. Provide guidance in identification and differentiation between "coping capacity" and "adaptive capacity" in a disaster management.
3. Stimulating awareness of disaster practitioners and policy makers related to different and dynamic context of disturbance which requires DRR framework that supports adaptation strategies.

Before DRR approach, disaster countermeasure initially focused on emergency aspect and technical prevention. Traditional disaster risk management undergo four type stages namely prevention, preparedness, response and recovery or PPRR approach (Howes, et al., 2012). Referring to deep uncertainty in disaster occurrence, disaster management is later acknowledged as a continuous phase which is not focus only on certain phases. Disaster management cycle from W. Nick (2008) showed in **Figure 2.8** gives clear illustration about disaster management phases. This cycle incorporate pre-disaster, post-disaster and in-between stages that each stage has different characteristics (see **Table 2.3**). This research tries to incorporate phases in this cycle to become inputs in exploring dimensions and criteria of coping capacity.

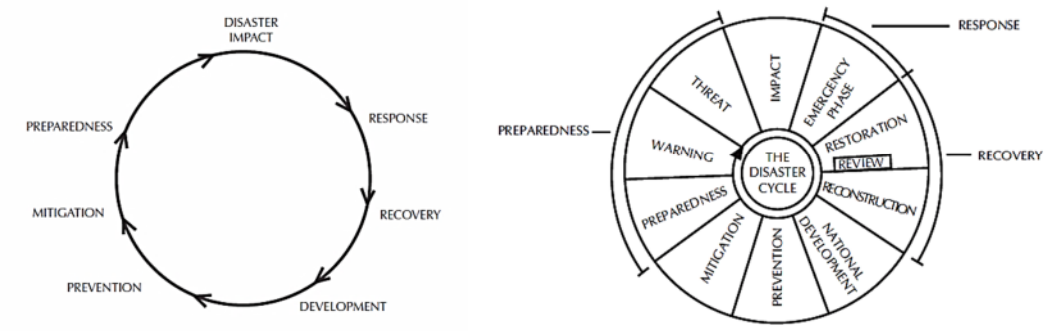

Figure 2.8 Basic & Alternative Format of the Disaster Management Cycle (Source: W. Nick, 2008)

These cycles are schematic and not necessarily seen as linear process because the important message is that disaster management is actually embedded in continuous development process. The cycle on the right is alternative format showing activity components within each phase. According this concept, there are two factors triggering actions in all phases which are "post-disaster review" and "results of exercise or simulation" (W. Nick, 2008). Both factors are relevant with "single loop learning" criteria in the original ACW that is defined as ability to improve routines.

However, the original ACW does not mention what kind of routines expected to be assessed. Consequently, it is necessary to re-structure and re-phrase some criteria in the original ACW and make it contextual in DRR context.

Table 2.3 Characteristics of disaster management phases
(Source: W. Nick, 2008)

Phase	Definitions	Problem Areas	Category
Response	Response phase in disaster management cycle measures those which are taken immediately prior to and following disasters. Such measures are directed towards saving life and protecting property and to dealing with the immediate damage caused by the disaster	• Background factors • Inadequate preparedness • Warning factors • Slow activation of the response system • Effects of Impact and Crisis Pressure • Difficulties in Survey of Damage and Assessment of Needs • Inaccurate and/or Incomplete Information from Survey • Convergence • Poor information management • Inadequate public awareness • Problems with the media • International assistance	Emergency & short term phase
Recovery	Returning the community to normal. (e.g. Temporary housing; grants; medical care)	• Delays • Inadequate information • Overlap program between sectors • Restricted finance • time issue • political issue • economic implications	Emergency post disaster & short term phase
Development	The development segment provides the link between disaster-related activities and national development	• Fragmentation between disaster and national development • Harnessing windows of opportunities from disaster experience • Difficulties in defining post-disaster recovery • Forecasting • Budgeting • Weak disaster management policy	In between & long term phase
Prevention	Measures that are aimed at impeding the occurrence of a disaster event and/or preventing such an occurrence having harmful effects on communities	• Traditional outlooks on reactive measures • High cost • Other government priorities • Political motives • Development problems • Unbalanced disaster management • Public apathy	Pre disaster & long term phase
Mitigation	Minimizing the effects of disaster (e.g. Building codes and zoning; vulnerability analyses; public education) or measures aimed at reducing the impact of a natural or man-made disaster on a nation or community	• Traditional outlooks on reactive measures • High cost • Other government priorities • Political motives • Inadequate standards of community self-reliance and self-help	Pre disaster & long term phase
Preparedness	Planning how to respond. (e.g. Preparedness plans; emergency exercises/ training; warning systems) or efforts to minimize the hazards created by a disaster (e.g. Search and rescue; emergency relief).	• Organization and planning • Resources • Coordination • Readiness • Training and public awareness	Pre disaster & long term phase

From the six phases in this cycle, response, recovery and development are the ones that relate to immediate events (emergency response). The other phases (prevention, mitigation and preparedness) have quite different characteristic because these phases deals with uncertainties for future disturbances. At glance, "response" and "recovery" are most likely seen as "coping capacity" while "prevention, "mitigation" and "preparedness" are more relevant to "adaptive capacity". Moreover, "development" phase is considered as in between process which contains synchronization between emergency recovery plans and on-going development plans.

W. Nick (2008) promotes transformation in development plans by synchronizing it with disaster management policies because disaster poses hindrance for plans implementation. Furthermore, this disaster management cycle also calls on legislation of policies which contains acknowledgement of disaster management values. Concerning about philosophy for coping with disaster, Nick suggests that disaster management cycle has foundational factors required for coping with disaster as follows:

- *organization*

  Disaster management should be acknowledged as additional content of a government system to effectively anticipate certain needs following disaster impacts. Disaster management organization also calls on DRR implementing agencies with explanation about the functions, management, staffing, and so forth. Furthermore, it is recommended that society involves and participate in organization management.
- *planning*

  The need for counter-disaster plans has been mainstreamed in DRR practices although most government systems are not supportive for this plan to be properly implemented. The backgrounds of this condition are unclear national policy, inadequate funding, limited expertise and others. Therefore, qualification of leading actors in DRR implementation needs to be formulated to meet minimum requirement.
- *Use of resources*

  Implementing maximum use of resources is considered as the most difficult issues in DRR. One of the reasons is related to delay that occur in resource

mobilization due to uncertain disaster impacts. Therefore, quick procedure activation, quick resource allocation and proper access to information are necessary aspects to be encouraged in DM policies. Another important area of resource that need is specialist skills

- *Specialist skills & training needs*

  Developing skills among personnel in DRR implementing agencies are necessary as well as assessment for their performance. It determines effectiveness of DRR implementation and hence training activity should be performed in all levels of government. Subsequently, training policies need to be provided to guide actors especially in local level.

Considering the importance of stimulating awareness of local actors in terms of DRR knowledge, two proposed dimensions of coping capacity are selected for this research. Those dimensions are "DRR acknowledgement" and "DRR operationalization". The different from the original ACW are the quality of resources is assessed such as speed of resource mobilization and proper access to information. It all focuses on the quality of DRR resources besides the availability. The following figures and explanations show the selected dimensions and criteria for coping capacity wheel.

Dimension 1: Acknowledgment of disaster risk reduction

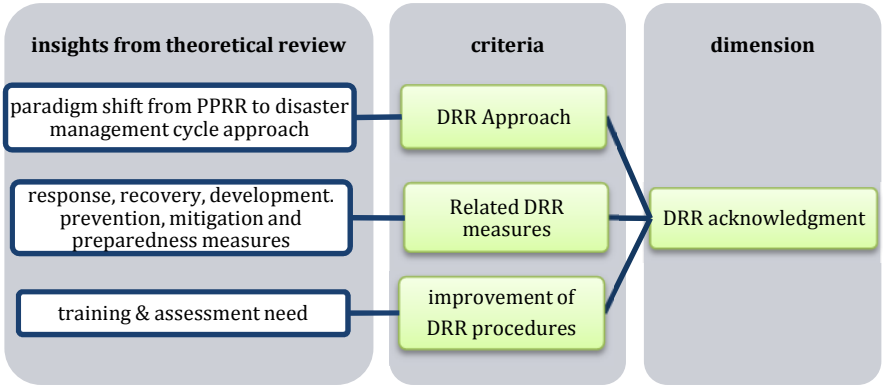

Figure 2.9 Formulation of "DRR acknowledgment" as coping capacity dimension (Source: Author)

This dimension emphasizes the importance of government and society awareness of disaster management (see **Figure 2.9**). "DRR acknowledgement" refers to legislation of DRR approaches that are adopted by a country and socialized to the society. In order to cope with perturbations and perform DRR measures, local actors should be

encouraged to notice and comprehend the selected DRR reference before making any adjustments. Recognizing existing "DRR approach" is the first essential step for local government and society to orientate their roles in DRR implementation, Moreover, availability of "related DRR measures" and ensuring "improvement of DRR measures" are considered as acknowledgment of the chosen DM reference because it represents components of the chosen approach in practises. This dimension is also fundamental for countries that poorly adopt certain DRR reference from other country or from NGOs technical assistance. As a first step before strengthening coping capacity of society, government need to show their capacity in properly adopting a specific DRR reference.

Dimension 2: Disaster risk reduction operationalization

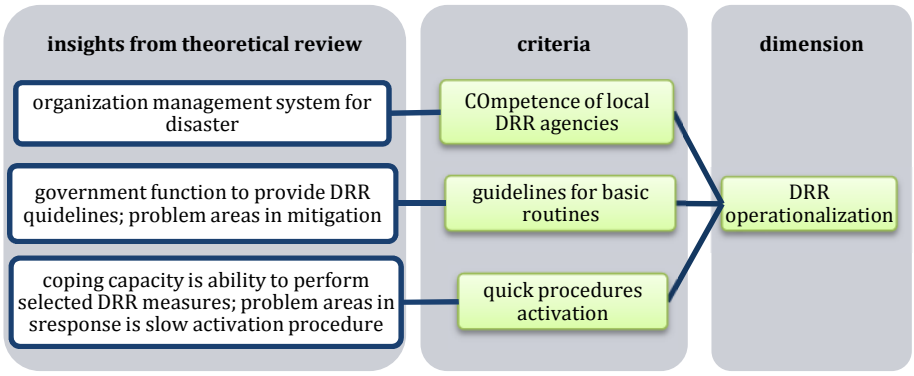

Figure 2.10 Formulation of "DRR operationalization" as coping capacity dimension (Source: Author)

A new dimension called "DRR operationalization" is formulated as one of coping capacity dimensions to identify performance of DRR measures. This dimension is chosen because it is aimed to represent various problem areas in disaster management phases. Besides recognizing disaster management and its reference, operationalization aspects also considered as one of criteria because it is related to related instruments that are utilized in DRR implementation. The criteria consist of "competence of local DRR agencies", "guidelines for basic routines", and "quick procedures activation". **Figure 2.10** informs the inspiration for formulating those criteria. As an instrument of coping strategies, this dimension facilitates local actors and society in performing necessary actions and it requires government maximize to their function and roles as DM manager.

Dimension 3: Disaster risk reduction resources

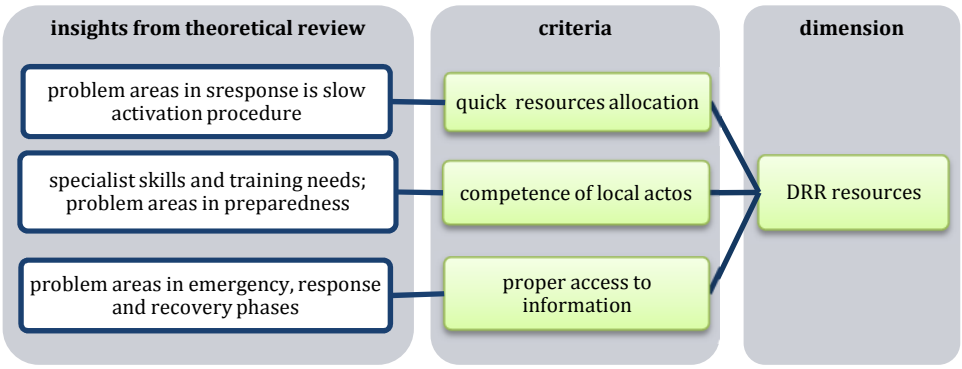

Figure 2.11 Formulation of "resources" as coping capacity dimension (Source: Author)

One of supporting dimensions in the original ACW, the "resources", is more relevant to be adopted as coping capacity than adaptive capacity criteria because it closely related with actual and immediate condition in practise. It consists of human, financial and authority resources. However, "authority" is difficult and quite abstract to be assessed through formal institutions. To make this dimension to be relevant to coping capacity urgency, this research proposes three criteria which emphasize responsiveness and qualification of DRR resources. These criteria are chosen to avoid bias in complementing wrong capacity such as availability of "quick resource allocation" procedure. Not only assess availability of DRR resources, suggestion about quality also needs to be identified in formal institution such as stimulating quicker allocation, setting "competence of local actors" and guarantee of "proper access to information". To summarize, **Table 2.4** provide descriptions of dimensions and criteria of coping capacity that are formulated for this research.

Table 2.4 Coping capacity Dimension and Criteria (Source: Author)

No.	Dimension	No.	Criteria	Inspirations	Example
1	DRR Acknowledgement	1	acknowledging DRR approach	Nick (2008); Coppola (2011)	building codes, zoning regulations, and spatial interventions (pro-active approach/ long term); building disaster infrastructures (preventive/ technical approach); focus on organizational, social, and individual preparedness (adaptive approach); traditional/ contemporary approach; and so forth

No.	Dimension	No.	Criteria	Inspirations	Example
		2	related DRR measures	Nick (2008); Coppola (2011)	Mitigation measures, prevention measures, and so forth
		3	improvement of DRR procedures	Gupta et al (2010); Nick (2008); Coppola (2011)	training, drills, evaluation, pilot projects
2	DRR operationalization	1	competence of local DRR agencies	Nick (2008); Coppola (2011)	Guideline for local DRR implementing agency
		2	guidelines for basic routines	Nick (2008); Coppola (2011)	Guideline for early warning system, emergency evacuation, rehabilitation & reconstruction, and so forth
		3	quick procedures activation	Nick (2008); Coppola (2011)	Guideline for setting emergency status, guideline for activation of command and control function
3	DRR Resources	1	quick resources allocation	Nick (2008); Coppola (2011)	Guideline for disaster fund distribution
		2	Competence of local actors	Nick (2008); Coppola (2011)	Guideline of minimum required expertise and actors capacity building
		3	Proper access to information	Nick (2008); Gupta et al (2010); Coppola (2011);	Guideline of disaster information centre
	TOTAL	**9**			

2.5. Conclusion: The New Adaptive Capacity Wheel and Coping Capacity Wheel

Summarizing two sub-chapters before, there are two different wheels in the same size that are used as assessment tool in this research. It shows the importance to differentiate adaptive capacity and coping capacity assessment in the context of multi-hazard. Coping capacity and adaptive capacity wheels have three dimensions and three criteria for each. Using these wheels, formal DM institutions in Padang are assessed to help answering research questions. Main research question aims at finding gaps of multi-level DM institution using adaptive capacity and coping capacity wheel.

The following **Figure 2.12** and **2.13** shows the new "adaptive capacity" and "coping capacity" wheel. Both wheels have the same number of dimensions and criteria to make it simple, compact and not exceeding six dimensions and 22 criteria in the original ACW. Instead, the new size is expected to make the two wheels simpler and more explicit. By creating two wheels with the same size, this research gives sense

that dimensions and criteria of "adaptive capacity" and "coping capacity" are equally important in assessing DM institutions. This can avoid dominant focus and scoring for one of the wheels. There are two main advantages of the new wheels:

1. It is useful for multi-hazard context (climate change as well as non-climate change disaster) because it gives attention for coping and adaptive capacity.
2. Enable users to focus on improvement of formal institutions. Users can work and get assessment results from policy documents as primary data.

Furthermore, the use of the wheels is explained in the next chapter as well as the use of methods or research protocol.

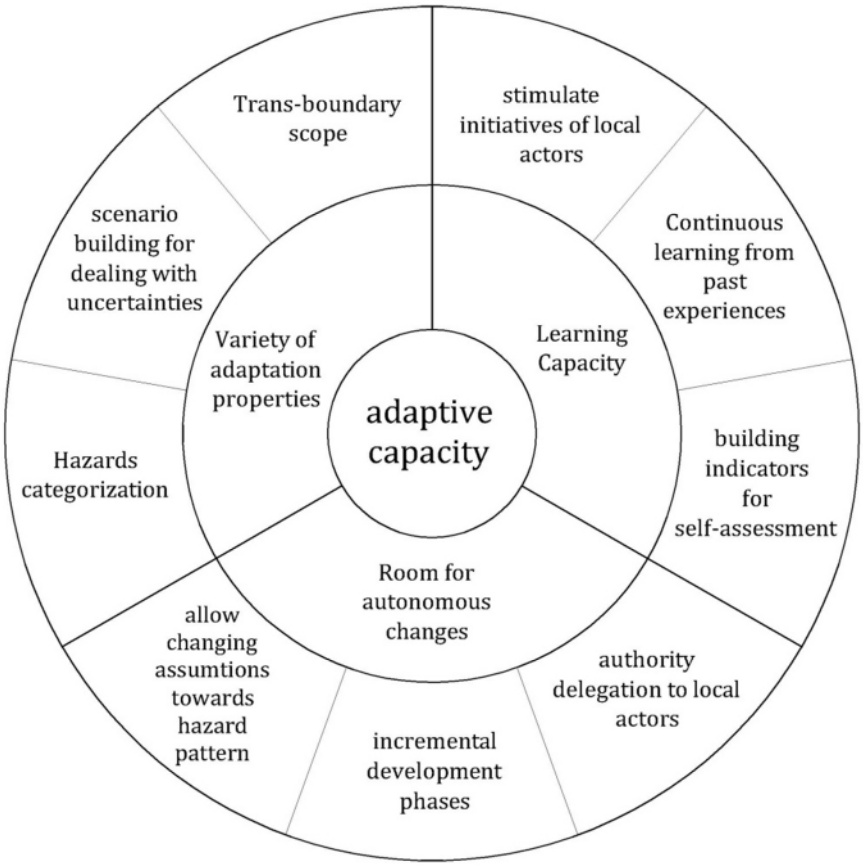

Figure 2.12 New adaptive capacity wheel (Source: Author)

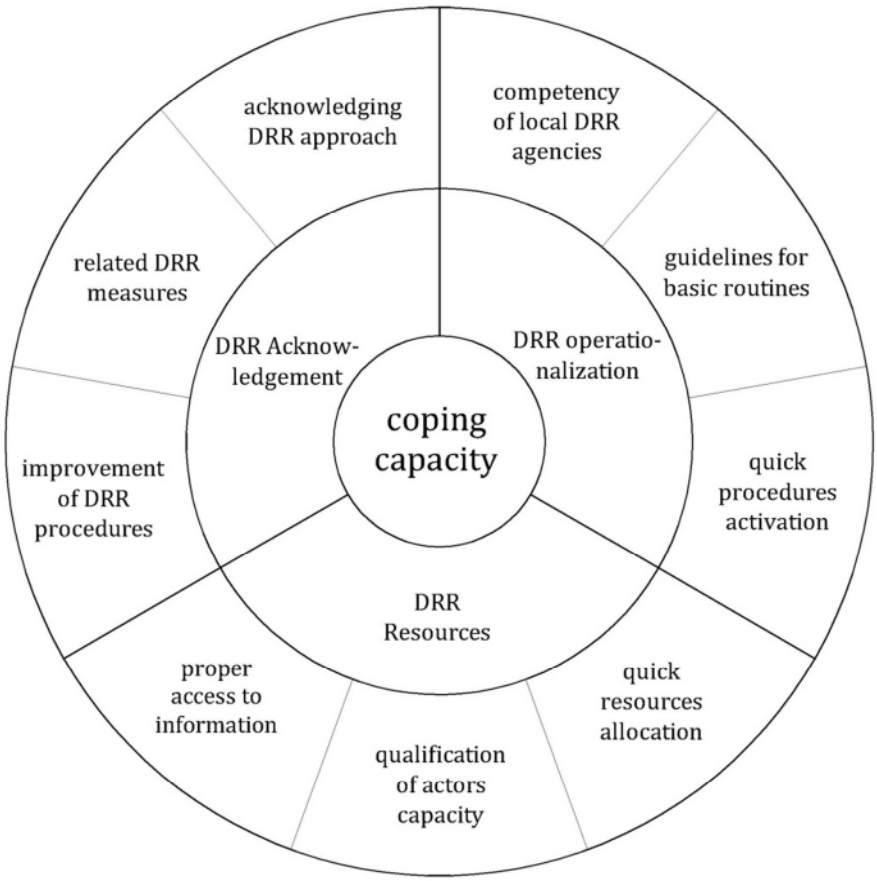

Figure 2.13 Coping capacity wheel (Source: Author)

CHAPTER 3
RESEARCH METHODOLOGY

In order to operationalize analysis and achieve the objectives, this research use qualitative method with content analysis. Adopting from Gupta et al. (2010), the method involves expert judgment and semi-quantitative scoring scheme based on the result of policy document analysis. Qualitative method has suitability for such exploratory research while in more contemporary views, the qualitative content analysis (QCA) seeks further for more valuable interpretive meanings (Zhang, et al., 2009). Here, policy documents are selected and used as primary data because this research focuses on formal institutions. The challenge in the analysis chapter is single objectivity from full involvement of researcher in this research. The researcher becomes the expert who assesses the case study and it is highly desired to maintain research objectivity in a transparent way of the scoring and interpretation.

3.1 Qualitative Content Analysis (QCA)

Discussion in theoretical debate on integrating DRR and CCA relies essentially in a specific context we would like to emphasize. Thus, in social science research, attention to specific contexts requires deep observation and intuitive steps. From content analysis on linguistic clue, researcher's priority is to derive semantic content (inherited or latent) which is very different with the quantitative method. This research uses case study of disaster management in Padang, - one of delta cities in Indonesia - to represents a complexity of urban governance system which is threatened by multi-hazard disaster. One of qualitative methods is the Qualitative Content Analysis (QCA). The QCA is a method for describing the meaning of qualitative material in a systematic way (Schreier, 2012). This is done by assigning selected textual data and categorizing it in a coding scheme. It has three characteristics: systematic, flexible and it reduces data.

Patton (2002) in Zhang, et al. (2009) stated that the QCA method is suitable to be applied in various type of data and it allows researcher to select policy document specifically to answer research question. This research utilizes the new adaptive

capacity and coping capacity for identification of strengths, weaknesses, gaps and other latent contents of DM formal institutions in Padang municipality. From the three characteristics, QCA is aimed at looking up data, discovering new things about it, and bringing it together in novel ways (Schreier, 2012). The following research protocol is adopted from Gupta et al. (2010) because it represents QCA research protocol in general. In general, there are four steps applied in this research which are:

1. Research preparation
2. Selection of data
3. Analysing the data
4. Interpreting, presenting and communicating the data

3.2 Method: Research Protocol for Institutional Assessment

3.2.1 Research preparation

In this expert judgement method, researcher itself will play the role as expert who qualitatively assess and gives score according to the result of policy document analysis. Policy analysis is conducted based on adjustment of dimensions and criteria of the "*Adaptive Capacity Wheel*" which is adopted from Gupta et al. (2010). In this step, researcher prepares themselves by ensuring sufficient knowledge and experience.

> *"…qualitative content analysis is mainly inductive, grounding the examination of topics and themes, as well as the inferences drawn from them, in the data. In some cases, qualitative content analysis attempts to generate theory."* (Zhang, et al., 2009)

As initial preparation, Researcher conducts desk study about each dimensions and criteria in order to understand them clearly so the researcher can deliver a credible assessment during analysis process. As a result, the previous chapter outlines theoretical review on challenge in the roles of adaptive institutions as well as dimension and criteria of adaptive capacity and coping capacity. Using adaptive capacity and coping capacity review in chapter two, assessors equipped themselves with definition, examples, or key words from each criterion. Thus, they can have better grasp in understanding all terms during assessment process.

In qualitative research, it is fundamental for researchers to position themselves in the whole process. This research uses DRR formal institutions (policy documents) that are related to Padang as a specific study case with specific type of risks (multi-disaster threats). I position myself as an expert in neutral position who conducts the assessment based on textual policy document. Policy documents used as primary references in order to ensure consistency of analysis. To assess the case study, this research is guided by research protocol methodology from the original ACW which consists of five steps (Gupta et al, 2010), namely research preparation, data collection, analysis, interpretation and presentation showing final result.

3.2.2 Selection of data

A disaster management (DM) institution in this research is defined as a set of disaster management related policies that are issued in a government level. Before conducting the QCA, textual documents are categorized. Previous research using the original ACW make document grouping based on different sectoral themes (Gupta, et al., 2010 & Klostermann, et al., 2010). From those previous examples of policy document analysis, individual score for each document is usually presented as the final result. This method is useful to formulate recommendations for improving each document. However, this research uses different way in policy documents classification. Each policy document is not scored individually but it is scored together with other DM policies in each level of government as a set of DM institution.

Since this research uses researcher as an "expert" who conducts policy document analysis, data selection determine the quality of the upcoming results. The more related the documents -as well as its quantity-, the more objectivity achieved. Thus, there are necessary steps such as:

1. Identifying long list of national, province and local laws and regulations which are specifically related to disaster risks management in Padang municipality
2. Narrowing the long list into a shortlist of documents related to with local actors or local government. This is important, for example, to exclude unrelated documents such administrative regulations among Head of BNPB Decrees (national agency) (see **table 3.1**)

To ensure contextual relevance of primary data, documentation and inventory of legal documents related to disaster management institution should be carefully chosen and categorized. Data selected for this research are policy documents (laws & regulations) about DRR in each level of government. Policy documents are selected based on its relevancy to DRR theme in Padang from three tiers of government (national, province, and local). **Table 3.1** informs list of policies which are analysed by using the QCA method and the help of qualitative analysis computer software, the Atlas.ti[1] version 6.

Table 3.1 Disaster management policies related to Padang Municipality (Source: Author)

No.	Level	No.		Policy Document	Category
1.	Local Policy	1	Local Act No. 03/ 2008	Disaster Management in Padang Municipality	base regulation
		2	Local Act No. 18/ 2008	Establishment of Organization and Working Arrangement of Padang Disaster Management Agency	Derivative regulation
		3	Mayor Regulation No. 58/ 2008	Description of Main Responsibilities and Function of Padang Disaster Management Agency	Derivative regulation
		4	Mayor Regulation No. 14/ 2000	Operationalization of Tsunami Early Warning System in Padang	Derivative regulation
		5	Local Act No. 25/ 2011	Permanent Disaster Management Procedures in Padang	Derivative regulation
		6	Local Act No. 5/ 2012	General Spatial Plan of Padang Municipality 2010-2030	spatial plan
2.	Provincial Policy	1	Provincial Regulation No. 5	Disaster Management in West Sumatra	base regulation
		2	Governor Regulation No. 23	Permanent Disaster Management Procedures in West Sumatra	Derivative regulation
3.	National Policy	1	National Act No. 24	Disaster Management Act	main law
		2	Central Government Regulation No. 21	Operationalization of Disaster Management	Derivative regulation
		3	Head of BNPB Regulation No. 10	Disaster Emergency Response Command	Derivative regulation
		4	Head of BNPB Regulation No. 24	Guideline for Making Disaster Emergency Operation Plan	Derivative regulation
		5	Head of BNPB	General Guideline for The	Derivative

[1] ATLAS.ti is data processing software which is developed to make quantitative outcome out of qualitative data. It offers a systematic approach to unstructured data, i.e. data that cannot be meaningfully analyzed by formal, statistical approaches.

No.	Level	No.		Policy Document	Category
			Regulation No. 1	"Resilient Village/ neighbourhood"	regulation
		6	Head of BNPB Regulation No. 2	General Guideline for Disaster Risk Study	Derivative regulation
		7	Head of BNPB Regulation No. 15	Guideline for Control Centre for Disaster Management	Derivative regulation
	TOTAL	**15**			

Categorizing documents based on level of government gives message that each level of government should introduce integrated DM policies to society as a set of DM institution. Thus, every policy in one set is complementary and integrated on its formulation, legalization and implementation. There are three primary documents (PD) categorized by three levels of government as follows.

1. PD-1: Institutions in national level which consists of six policy documents. These numbers of policy document is already shortened based on its relevancy and excluding older and/or redundant documents
2. PD-2: Institutions in provincial level which consists of two policy documents
3. PD-3: Institutions in municipal level which consists of seven policy documents. 5 out of 6 documents are scanned images because it is not available online. These documents are collected during my field survey to Padang municipality in July 2012. Difficulties in collecting the document because most government office buildings are collapsed during the last earthquake in 2009. However, I've collected local regulations from Legal Division Office of Padang Municipality at the new government relocation area of Air Pacah, Padang.

3.2.3 Analysing the data

According to research objectives, this research aims at assessing DM institutions in Padang using the new "adaptive capacity wheel" and "coping capacity wheel" inspired by the method in the original "adaptive capacity wheel" (Gupta, et al., 2010). The new wheels are formulated in chapter two by adjusting dimensions and criteria with multi-disaster risks context (see **Figure 2.11** and **Figure 2.12**).

> *"Qualitative content analysis goes beyond merely counting words or extracting objective content from texts to examine meanings, themes and patterns that may be manifest or latent in a particular text"* (Zhang, et al., 2009)

In subsequent final results, the terms "meanings", "themes" and "patterns " are represented as "strengths", "weaknesses", "consistency" and "distortion" of the multi-level DM institutions. Therefore, combination of "latent coding" (semantic analysis) and "manifest coding" is required in QCA method (Berg, 2001) for interpreting coding results of textual documents.

Working with three sets of DM institutions, three dimensions and nine criteria are assessed for each coping capacity and adaptive capacity wheel. In this analysis stage, there are three coding steps as follows.

1. Defining the unit of analysis

> "*When using theme as the coding unit, you are primarily looking for the expressions of an idea (Minichiello et al., 1990). Thus, you might assign a code to a text chunk of any size, as long as that chunk represents a single theme or issue of relevance to your research question(s).*" (Zhang, et al., 2009)

Unit of analysis is one of the most important elements in coding because it helps to classify coding in structured way according to researcher needs and research objectives. Quotation above is very much represents the context of this research by assessing policy documents. It is quite difficult to code policy documents because it contains formal words and sentences, thus need subjectivity of researcher to interpret implicit meanings and code it as the relevant criteria. Fortunately, the new adaptive capacity and coping capacity wheels has smaller dimensions and criteria compared to the original one. Both wheels have nine criteria each that are considered as the themes or unit analysis in coding process. **Table 3.2** listed criteria as units of analysis to be linked with relevant quotations from each policy documents. To maintain level of relevancy in expert judgement, researcher refers to description and example from **Table 2.2** and **Table 2.4** in Chapter 2.

Table 3.2 List adaptive capacity and coping capacity criteria as units of analysis (Source: Author)

No.	AC Dimension		Criteria as unit analysis of adaptive capacity wheel
1	Variety of adaptation properties	1	Hazards categorization
		2	scenario building for dealing with uncertainties
		3	Trans-boundary scope (multi-sector, multi-level, multi-discipline, multi-actor)
2	Learning Capacity	4	stimulate initiatives of local actors
		5	Continuous learning from past experiences

No.	AC Dimension		Criteria as unit analysis of adaptive capacity wheel
		6	building indicators for self-assessment
3	Room for autonomous changes	7	allow changing assumption on hazards pattern
		8	incremental development phases
		9	authority delegation to local actors
No.	**CC Dimension**		**Criteria as unit analysis of coping capacity wheel**
1	DRR Acknowledgement	1	acknowledging DRR approach
		2	related DRR measures
		3	improvement of DRR procedures
2	DRR operationalization	4	competency of local DRR agencies
		5	guidelines for basic routines
		6	quick procedures activation
3	DRR Resources	7	quick resources allocation
		8	qualification of actors capacity
		9	Proper access to information

2. Creating and managing a basic HU (*Hermeneustic* Units)

   HU is the skeletal structure of an analysis project in QCA software or often defined as the science of interpreting text empirically. This research uses official documents listed in **table 3.1**. Primary documents are categorized based on different level of government (national, province, and local) and each level is defined as a single *Hermeneustic* Unit (HU) using the Atlas.ti computer software.

3. Evaluation and Modifying Coding Frame

   This phase consists trying out different dimensions and criteria from theoretical review while developing it to become concrete and contextual for the study case (multi-hazard and multi-level formal institutions). Different coding system using the qualitative analysis software has been iteratively tested and modified until it become fit to the context. Hence, it turned out that six Dimensions and 22 criteria of the original ACW (Gupta, et al., 2010) are adjusted and modified due to context and urgency of this research.

3.2.4 Interpreting, presenting and communicating the data

The fourth step in the research protocol is to connect findings from coding into interpretive stories about adaptive and coping capacity dimensions and criteria that are presented in each level of government. Goal of this step is to describe elaborated strengths, weaknesses and content gap of each level of DM institutions related to Padang in terms of coping capacity and adaptive capacity. In this step I use

instruments that I propose in chapter two (the new adaptive capacity and coping capacity wheel).

Both wheels are structured in both interval and ordinal scale before it is described qualitatively as a story to be communicated as recommendations. This step consists of subjective interpretations (latent meanings) since the tools only give information about number of quotations (manifest result). **Table 3.2** and **Table 3.3** are the scoring schemes used in this research that are modified from the original ACW. This content analysis is tested while trying out dimensions and criteria that are already formulated in **chapter 2**. To do the analysis part, this analysis uses:

1. Proportion charts of policy documents shows coping capacity and adaptive capacity quotations count to know distribution of contents in percentages. Later, this chart informs dominant focuses and least focused-themes of each DM institutions.

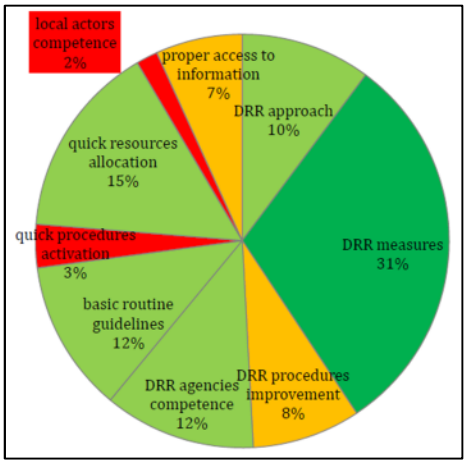

Figure 3.1 Example of a proportion chart (Source: Author)

2. Scoring scheme from relevant quotations to show qualitative judgment from the policy document analysis. This scoring scheme differentiates interpretation result of dimension and criteria. For adaptive and coping capacity criteria (see **Table 3.2**), results are scored for its availability and influence to the related dimension (foster, neutral, or obstruct the dimension) (see **Table 3.3**). Meanwhile, **Table 3.4** shows how aggregated scores from related criteria are translated into description about the overall effect of each dimension in DM

institutions to the adaptive and coping capacity of society. It is represented by interval score between 2 to -2 or, in ordinal scale, positive to negative effects.

Table 3.3 Scoring scheme for each criteria in the new wheels (Source: Author, modified from Gupta et al., 2010)

Aggregate scores for each criteria				
Green	**Light Green**	**Grey**	**Orange**	**Red**
Institutional structure potentially foster AC or CC dimensions	The structure exists but it needs additional explanations to AC or CC dimensions	Neutral score (positive nor negative effect expected)	Gap that needs to be filled to counteract negative effect on AC or CC dimensions	Institutional structure is potentially obstructs AC or CC dimensions
Score 2	**Score 1**	**Score 0**	**Score -1**	**Score -2**

Table 3.4 Result interpretation scheme for each dimension in the new wheels (Source: Author, modified from Gupta et al., 2010)

Effect of institution on adaptive capacity or coping capacity	Score	Aggregate scores the each dimension
Positive effect	2	1.01 to 2.00
Slightly positive effect	1	0.01 to 1.00
Neutral or no effect	0	0
Slightly negative effect	-1	-0.01 to -1.00
Negative effect	-2	-1.01 to -2.00

3. Scoring remarks tables as summary of scoring process after coding. This table informs reader how the coded quotations are linked to adaptive and coping capacity criteria. As explained before, this is the part when experience, knowledge and consistency of researcher are challenged to discover meanings from the quoted text. This table presents scores for each dimensions and criteria as well as remarks on how and why each criterion is given certain score.

Table 3.5 Example of scoring remarks table (Source: Author)

Dimension	Criteria	Score	Scoring remarks
DM Acknowledgment **Score= 4/3 = 1.33**	**acknowledging DRR approach**	**1**	• One point is dedicated for acknowledging the HFA as main reference and also introducing "*disaster resilient community*" program as a pilot project. • To improve the score, statement that are contradict to the HFA approach should be re-considered, such as: *"Government gives protection for society from disaster threat…* *"Government gives social protection and safety for vulnerable society groups"* Because it gives impression that protection from (uncertain) disaster threats is government responsibility. Meanwhile in the HFA, community is considered as the primary actor

4. Overlay techniques is presented in chapter five to identify consistency and distortion between dimensions and criteria scores in within level of DM institutions. This technique is useful to give clear illustration and help answering main research question. Consistency shown by similar criteria which have same score in each level. Meanwhile, distortion is identified from decreasing score of criteria from national level as the main reference to local level.

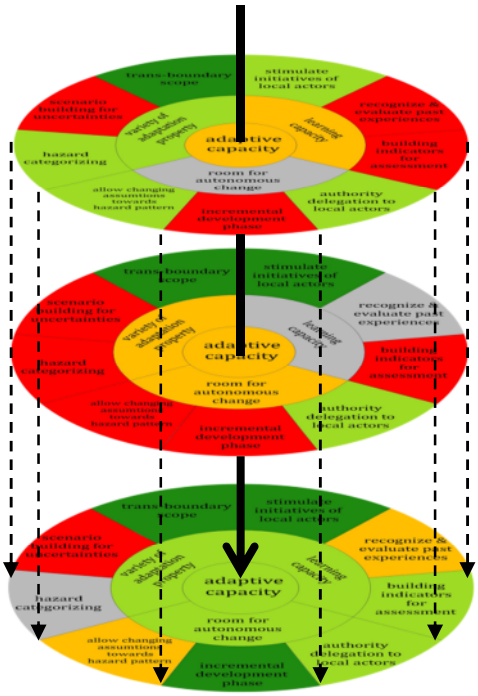

Figure 3.2 Illustration of wheel overlay technique (Source: Author)

3.3 Evaluation of Interpretive Research

Policy document analysis using the QCA method is finalized with interpretive results. It connects findings from coding to scoring process. As a qualitative research, the research protocol explained previously is advantaged by efforts to make latent judgement in order to derive meanings and inferences out of formal policy documents. It provides additional values than just presenting frequency and number of quotations (manifest coding) as back in the day when traditional QCA method is initially applied. However, many people have several concerns about the

evaluation of this method. Quantitative research has clear evaluation techniques to test validity and credibility of the analysis result. Meanwhile, Weber (1990) in (Zhang, et al., 2009) stated that qualitative research has critical points in terms of subjectivity in performing semantic judgment (latent coding involving researcher's view).

Apart from the critical concerns about the QCA, Lincoln and Guba (1985) in Zhang, et al., (2009) developed four criteria to evaluate an interpretive research such as the QCA. These criteria are "credibility", "transferability", "dependability" and "conformability". According to their definitions, "credibility" of QCA is evaluated from transparency of the process (coding, scoring and interpreting data). Secondly, "transferability" is evaluated from how applicable is the coping capacity and adaptive capacity wheels for other contexts. Third, "dependability" is evaluated from the consistency of coding, scoring, and interpretation process within three levels of DM institutions. Lastly, "conformability" is evaluated from how the proposed wheels and protocol can be understood by readers or other researchers. Regarding the four evaluation criteria, this research is a challenge to be evaluated since the protocol is conducted by an independent coder, the researcher itself. The results of evaluation using the four criteria are presented in chapter six.

CHAPTER 4
COPING WITH MULTI-HAZARD THREATS: THE CASE STUDY OF PADANG

This chapter presents contextual aspects of the research which is the case study of disaster management in Padang. Outlines of this chapter shows empirical evidence carried out from relevant literature about current disaster management in Padang. Empirical knowledge described in this chapter is harnessed as basis for interpreting the results of the assessment in chapter five and six. Generally, this chapter describes how Padang as a coastal city currently copes with multi-hazard risks from both climate change and non-climate change disasters.

4.1 Introduction: Disaster Risk Profile in Padang

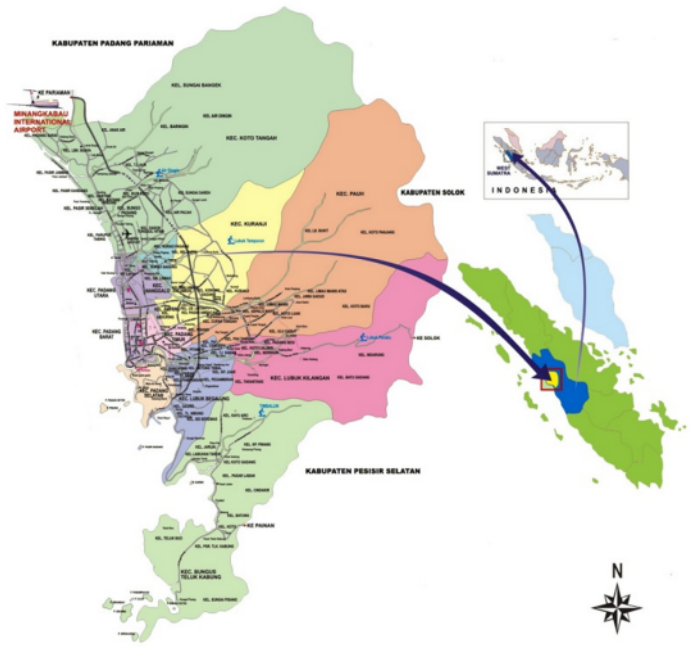

Figure 4.1 Orientation map of Padang (Source: www.padangtourism.info)

Padang, one the biggest delta cities in Indonesia, is located in the western coast of Sumatra island. Padang is the capital of West Sumatra province with population of almost one million in 2011 (www.bkpm.go.id). Padang has long history of development since this city is one of the oldest cities in western coast of the Indian Ocean (www.padang.go.id). In 18th century, this city was occupied by the Dutch colonial as their defence and trading centre in western Sumatra area. Having a big harbour, big factories and abundant coal mining, Padang has been equipped by railway network since 19th century to support mobilization its major commodities. Since then, infrastructure network in Padang has been expanded especially since the construction of an international airport. Urban transportation system and other infrastructure in Padang currently support goods

distribution and people mobilization throughout Sumatra and other islands in Indonesia. This city plays important roles in supporting regional and national economy.

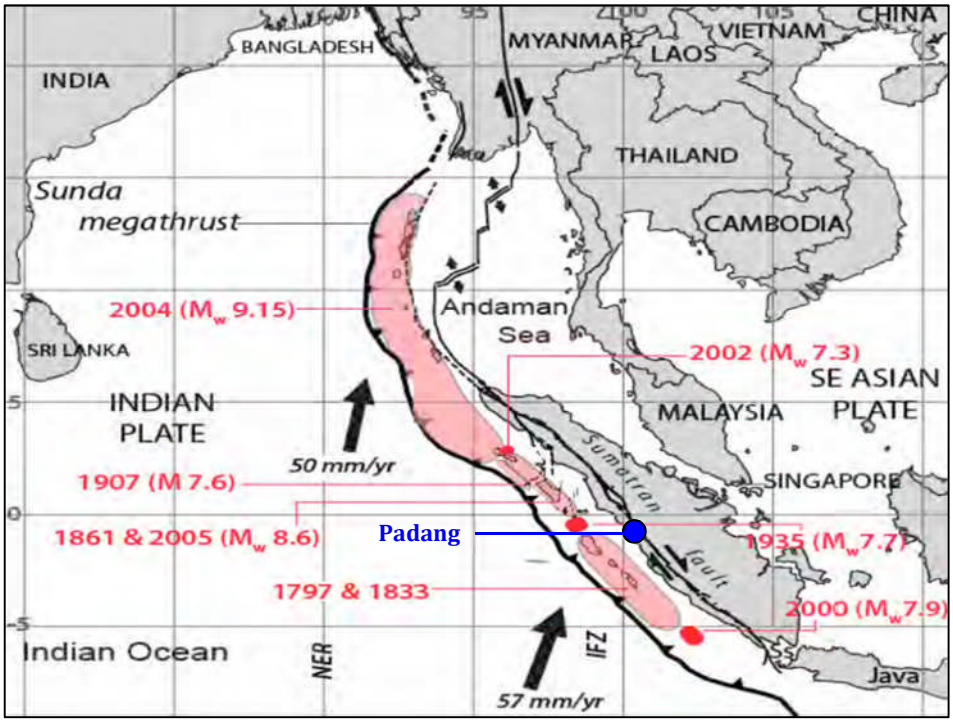

Figure 4.2 Position of Padang and Sunda *megathrust* (Source: Image courtesy of Kerry Sieh in Drake, 2009)

Apart from the important roles of Padang, this city three major issues regarding its geographical characteristics. First issue, Padang is a coastal front city which has surface below the sea level (Taubenbock, et al., 2009) and hence it is influenced by sea level rising. Secondly, Padang as a delta city is also threatened by flood risks from three main river estuaries (Ditjen Cipta Karya, 2010). Lastly, this city is situated above one the most active and unstable plates in the Pacific *ring of fire*[2] which make it vulnerable to tectonic hazards. The last type of hazard is the most concerned issue in Padang due to its catastrophic triggered by long term cycle of *megathrust*[3] earthquake in Sunda arc (see **Figure 4.2**). According to Rastogi and Jaiswal, (2006) in Taubenbock, et al., (2009), Sunda arc has produced 80% of tsunami in the world and each comes in averagely every three years. The *megathrust*

[2] The Pacific *ring of fire* is a 40.000 km belt surrounding the Pacific Ocean where tectonic hazards often occur due to the world's most active volcanoes and plate movements.
[3] *Megathrust* is the most powerful energy source of earthquake produced from a subducted large tectonic plate by another plate. It has triggered mega-scale earthquakes which exceeds magnitude 9.

cycle itself has stored energy of more than 8.5 M_w earthquakes and has been awaited to be released in every 200 years (McCloskey, et al., 2010 & Chang Seng, 2010). That cycle is however hardly predictable and can happened anytime without noticeable warning or symptom. Since 2004, scientists from many countries predicted warns people of Padang and local government that the *megathrust* has probability to occur in the following decade. Even though there was a 7.9 M_w earthquake in 2009, scientists still have no clue about approximate time the *megathrust* will release > 9 M_w earthquake.

Table 4.1 Statistics of major earthquakes, tsunamis and level of impacts in Padang (Source: Chang Seng, 2010)

No.	Year	Earthquake Magnitude (Mw)	Flow Depth (m)	Death Toll	Level of Damage
1	1797	8.7 – 8.9	5-10	2	*Several houses washed away*
2	1833	8.9 – 9.1	3-4	*Numerous but unknown*	*Considerable damage*
3	1861	-	-	725	-
4	1935	7.7	-	11	-
5	2000	7.9	-	-	-
6	2005	8.6	-	-	-
7	2007	7.9	-	-	-
8	2009	7.2	-	1100	-

In addition to earthquake issue, Padang has high probability of earthquake disasters that are potentially followed by tsunami and landslide. These multi-hazard risks have been noticed in Padang since the first *megathrust* rupture occurred in 1797 (Chang Seng, 2010). Until nowadays, small earthquakes still occur continuously and it can be seen in **Table 4.1** that mega-earthquake frequency in Padang has been increased in three centuries. Unfortunately, not many people realize that a 7.2 magnitude earthquake in 2009 was not the only trigger of catastrophic building collapse that claimed more than a thousand lives in Padang. The actual cause of the severe impacts is combination between sandy soil characteristics and ground liquefaction from sea level and river bank level rise. Besides tsunami, earthquake also triggered soil liquefaction in Padang (Grundy, 2010 & Hakam, 2012) which can be accelerated by precipitation of sea water in ground areas below sea level (Yasuhara, et al., 2012). This fact is important because it implies that focusing on earthquake and tsunami is not sufficient enough to explain what just happened in

2009. Since then, disaster practitioner start to link earthquake, soil characteristics and climate-related events such as sea level rise which makes ground inundation becomes faster in Padang. Consequently, updated knowledge about both climate change and non-climate change related disasters are crucial in understanding autonomous disaster impacts.

Figure 4.3 Sinking buildings in Padang due to the soil absorbance effect from earthquake and soil liquefaction in 2009 (Source: EERI, 2009)

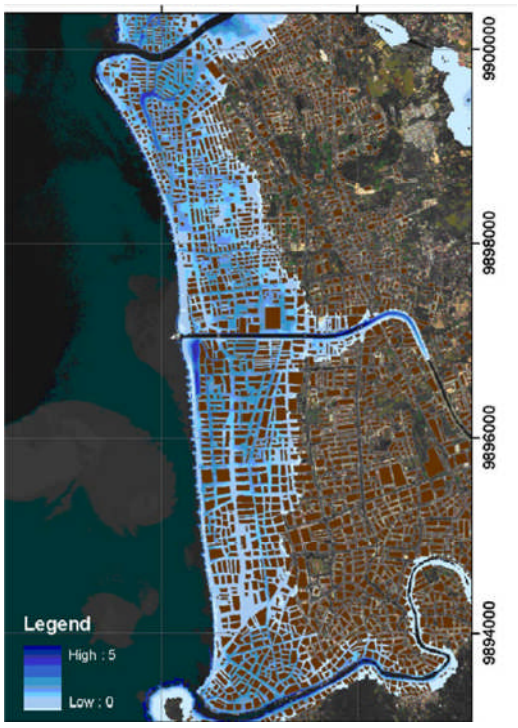

Figure 4.4 Estimated tsunami inundation within 10 minutes (Source: Taubenbock, et al., 2009)

Apart from hazards, disaster risks in Padang are also determined by vulnerability function (Taubenbock, et al., 2009). As evidence, severe impacts of the disasters in 2009 are not only triggered by the fact that Padang is located below sea level and just 40 km away from Indo-Australian and Eurasian plates joint (Chang Seng, 2010). High vulnerability in Padang has been influenced by exposure from number of people living in this city. In average, number of inhabitant in Padang increases 2.5 % every year due to agglomeration (RTRW Kota Padang, 2010). If a *megathrust* earthquake occurs, a large number of exposed people in

coastal area will have difficulty to evacuate from tsunami inundation (see **Figure 4.4**). According to Earthquake Engineering Research Institute, the 2009 event shows that people in Padang took few hours to reach higher ground rather than 20 minutes estimated time of tsunami inundation (EERI, 2009). In that case, it is predicted that at least 100.000 people in coastal front will be directly hit by tsunami before they can evacuate (Cedillos, 2010). Lack of awareness for proper evacuation and poor coordination between DM implementing agencies and society are the main hindrances in early warning phase.

Table 4.2 Hazards categories
(Source: Adger, et al., 2004)

No.	Category	Example
1	Discrete recurrent hazards	case of transient phenomena (e.g. storm, drought and extreme rainfall)
2	Continuous hazards	increases in mean temperatures or decreases in mean rainfall occurring over many years or decades (such as anthropogenic greenhouse warming or desiccation such as that experienced in the Sahel over the final decades of the 20th century)
3	Discrete singular hazards	shifts in climatic regimes associated with changes in ocean circulation; the *palaeoclimatic* record provides many examples of abrupt climate change events associated with the onset of new climatic conditions that prevailed for centuries or millennia

To understand how natural disaster can influence adaptive capacity, hazards categorization by Adger, et al. (2004) is useful in a way that it differentiates frequency and the relation with climate change (see **Table 4.2**). Based on these categories, the three types of natural hazards in Padang (earthquake, landslide and soil liquefaction) are categorized as discrete recurrent hazards because it randomly occurred and does not have certain pattern. Moreover, Padang also threatened by continuous flood hazards due to major rivers overflows, heavy rainfall and sea level rise. Moreover, Padang also has one specific threat, the *megathrust* earthquake that is triggered by long term tectonic activities within every 200 years approximately. Data series on the last type of hazard shows increasing frequency in the last two decades. Moreover, study about the *megathrust* earthquake risks in Padang implies that this city is currently threatened by mega-earthquake which could strike in near future. This discrete singular hazard implies that Padang should associate its DRR approach with adaptation strategies.

4.2 References of Disaster Management in Padang

Since there is a shift paradigm in counter-disaster practise worldwide from traditional PPRR to integrated DRR approach (see **Chapter 3**), the "disaster management cycle" by W. Nick (2008) has been represented through global platform namely Hyogo Framework for Actions (HFA) 2005-2015. For most countries, this is the most acknowledged platform that suggests integration of DRR into governance system in all levels (see **Figure 4.5**). The HFA consists of five priorities of actions as a follow-up of previous platform implementation, the Yokohama Strategy in 1994 (UNISDR, 2005). Each countries signed the HFA has different priority for actions.

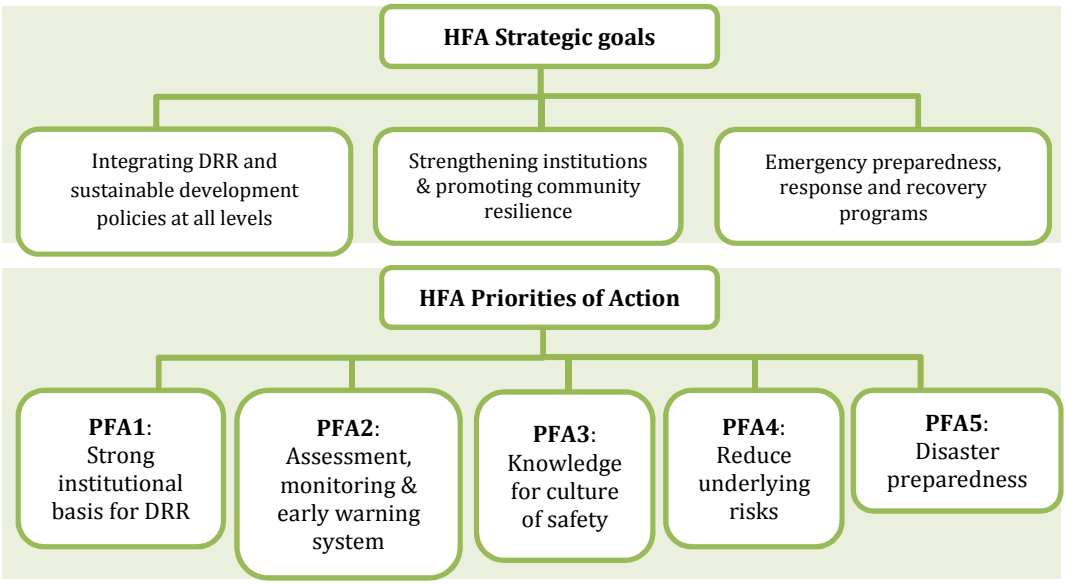

Figure 4.5 The HFA platform (Source: adopted from Childs, 2013)

According to the Global Assessment Report (GAR) on DRR in 2013, Indonesia has been implementing the HFA priority of action since 2005. From the five priorities of actions, this country only focuses on the fourth (PFA4) which is reducing underlying risk factors (UNISDR, 2013). From three key activities in the PFA4, there is one point closely related to DRR and CCA integration. This key activity proposes three important strategies:

1. Identification of climate-related disaster risks
2. Specification of DRR measures

3. Improvement and continuous use of information about climate-related risk

Moreover, there are five core indicators from the PFA4 that should be performed by integrating DRR into:

1. environmental policies (including CCA policies)
2. social development policies and plans
3. economic policies and plans
4. planning and management of human settlements
5. recovery and rehabilitation phase
6. availability of assessment procedures for disaster risk impacts

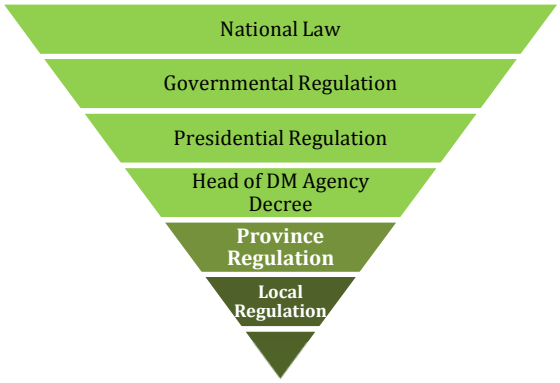

Figure 4.6 The hierarchy order of the DRR legal system in Indonesia (Source: Author)

Based on GAR report, Indonesia was scored 3.3-3.8 during 2011-2013 progress on PFA4 implementation meaning that achievement is not substantial and comprehensive even though it shows institutional commitment. Although decentralization system has been applied since 2004, unclear legal aspects and institutional framework in Indonesia become serious challenge in implementation of the HFA. This report also stated that overlapped interpretations about the HFA between different ministries should be reduced for successful integration between DRR, environmental policies and development plans. Regarding this new law, Indonesia established its National Disaster Management Agency. However, poor establishment and organizational capacity still becomes hindrance for DRR implementing agencies in provincial and local level. Hierarchical multi-level governance in Indonesia (**Figure 4.6**) makes derivation and synchronization between policies and between different levels somehow become distorted, generalized and fragmented in local level. Indonesia signed the HFA in 2005 which marked it as momentum of opportunity to make institutional transformation after tsunami. The evidence of changes in institutions is signed by legalisation of the newest Disaster Management Law No. 24 in 2007 followed by subsequent derivative laws and regulations (see **Figure 4.7**).

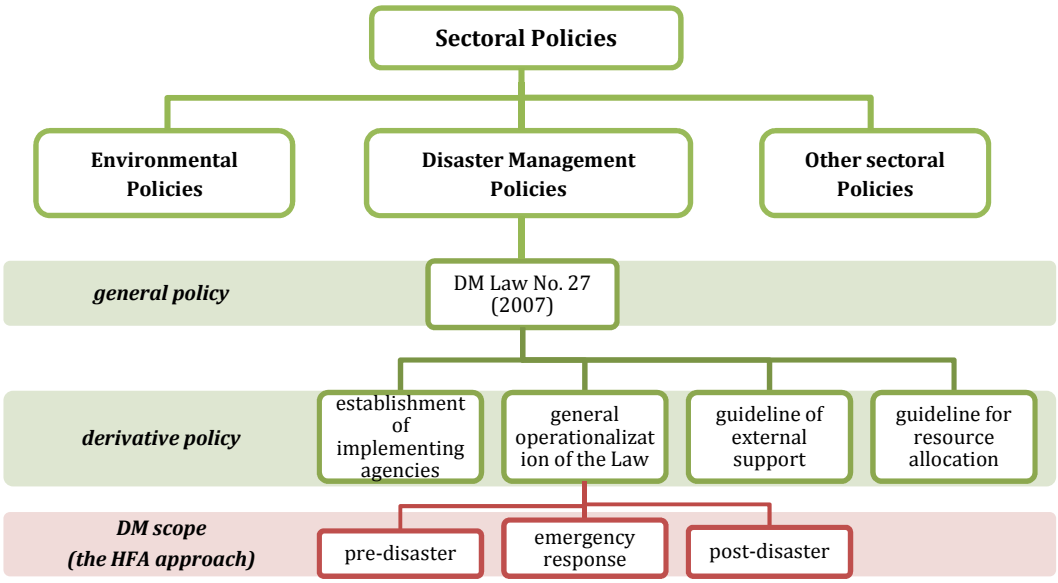

Figure 4.7 Institutional arrangements for DRR in Indonesia (Source: Author)

Acknowledging the HFA as main reference, Central Government developed instruments to assess DRR in local level. First assessment is to identify DRR capacity based on the HFA for national to local level. Another assessment is related to central government pilot project on Disaster resilient village/ neighbourhood. This instrument classifies three levels of community resilience based on six indicators. Both instruments are not obligatory for governments to conduct and it focuses mainly on disaster risk reduction. In conclusion, current indicators in DRR represent disaster risk management approach in Indonesia while current situation demand for more than risk reduction measures. Next part shows empirical evidence in Padang that this city requires different approach and adjustment to adapt with *megathrust* threat or in other words, be more flexible.

4.3 Government Approach for Society in Terms of Disaster Risks

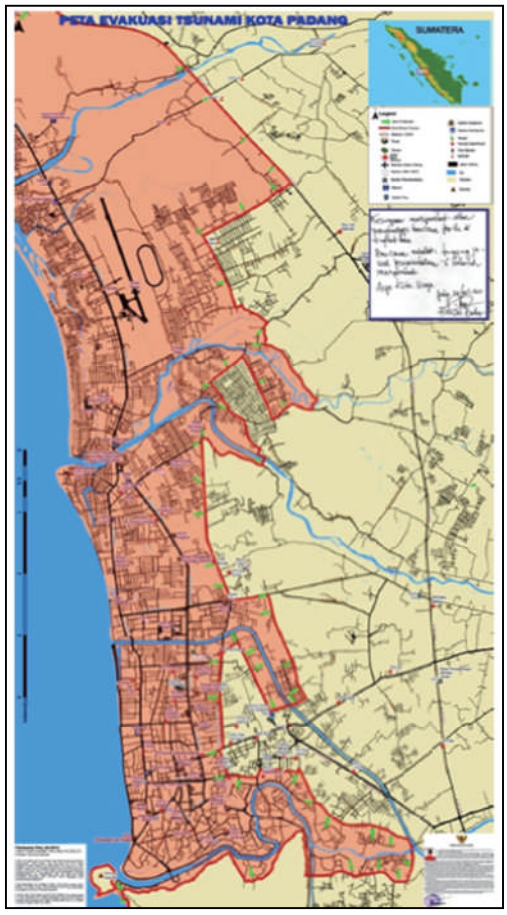

Figure 4.8 Official tsunami evacuation map of Padang municipality (source: BPBD Kota Padang, 2010)

Among all disaster management measures mentioned in current disaster management policies, Local Government of Padang keeps their focus on increasing evacuation infrastructures such as temporary shelters and evacuation routes in the red zones (see **Figure 4.8**). There is no significant and innovative actions related to society safety regarding to the *megathrust* threat. Although an official tsunami map published in 2005, there is still incomplete information provided in this map especially temporary shelter location and other basic elements needed during emergency response (Imamura, et al., 2011). Besides planning and providing evacuation infrastructure, internal agencies in local level start to introduce different approach to the society. Temporary implementing agencies such as Rehabilitation and Reconstruction Operational Agency in Padang presented an emergency action plan to Local Legislative Body in 2009. In this proposal, technical team presents scenario building for Padang in 2015 (see **Figure 4.9**). This matrix is an influence diagram and often used to accommodate future visions in within the four quadrants based on selected key uncertainties (Wulf, et al., 2010). According to the proposal, scenario I are proposed to be chosen as appropriate scenario after earthquake in September 2009. The "Padang New City" scenario is proposed with the following action plans (BPRR, 2009):

1. Relocating centre of government to safer location
2. Distributing function of the main market into smaller market and plan to build terminals based on activity core.

3. Renewal of old town (Renewal of traditional market, construction of modern market, arrange green space, informal sectors, and old building preservation)
4. Stimulate and facilitate development and recovery of house due to earthquake

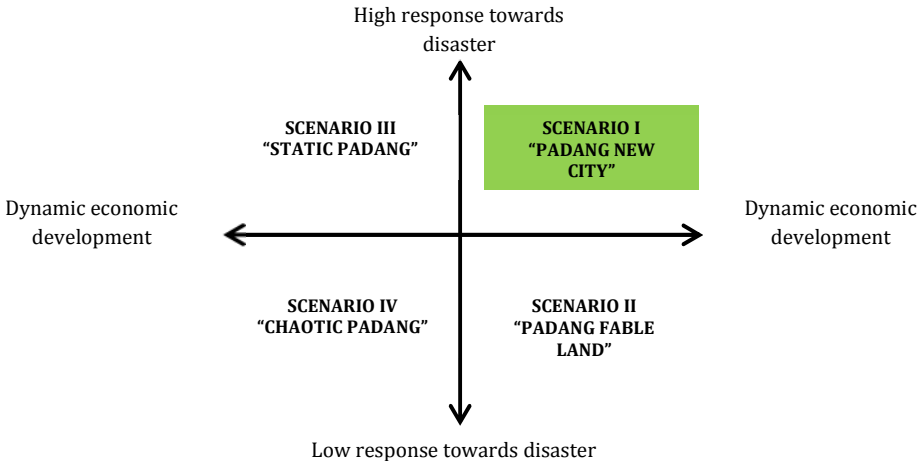

Figure 4.9 Matrix of scenario logics proposal of Padang in 2015 (Source: BPPR Padang, 2009)

Although Scenario I is not yet integrated in any official plan in Padang, the first action plan is already legalized by President through Governmental Regulation No. 26 year 2011 titled "Relocation of Padang Government Centre from Padang Barat district to Koto Tangah District". Subsequent to this first action, the next steps are too complex thus this scenario is difficult to be implemented. The steps consist of revision of general spatial plan, long-term city development plan, and sectoral strategic plans. According to my experience as a spatial plan evaluator in Central Government, revising a general spatial plan itself need more than a year of technical, administrative and legislative process. Similarly with other development proposal, decision is in legislative body which is usually took a while to be convinced with unusual ideas. This shows that current public decision making system need to be more responsive, quick and flexible towards innovation.

4.4 Society Robustness towards Disaster Threats

As the capital of West Sumatra province, Padang has been supporting economic development in this province. Five of eleven sub districts are located in coastal zone and three of it has relatively high-density built-up areas and also population distribution of Padang municipality. Unfortunately, three sub districts (Koto Tangah, Padang Utara, and Padang Barat) have relatively higher exposure of tsunami hazards compared to the others due to location right in the watershed as well as its population and built-up area density. According to the official tsunami evacuation map, approximately 60% of Padang inhabitants are living in red zone as well as economy, government and education centres. The pattern of population and built-up area distribution in Padang contribute to vulnerability of this city since most of the concentration is located very close to the coastal area where it is geographically has high tsunami disaster risk. Unfortunately, people in this city are still reluctant to relocate themselves to relatively safer parts of the cities due to social, cultural and economic reasons. Since that disastrous event, local government (encouraged by international NGO and upper level of government) started to initiate major adjustment in order to anticipate similar impacts. Local government made decision to relocate government centre from Padang Barat district to Aie Pacah in Koto Tangah district. This plan is now still implemented based on principal acknowledgement from President. Although this adjustment is very costly and remains controversial for many people, local government continue to relocate to avoid red zone of tsunami and move to higher ground in northern part of the city (see **Figure 4.10**).

Figure 4.10 Relocation of Government Centre in Padang (Terrain map source: Google maps)

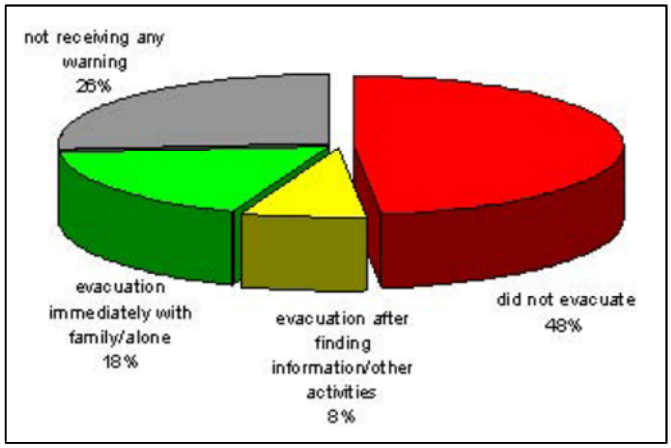

Figure 4.11 Various responses to the warning during a potential tsunami experience in 2009 (Source: Taubenbock, et al., 2009)

Since 2005, only limited element of society like private sectors showing their concern for DRR and it has been promoted by Central Government (Sieh, 2006 & Mercy Corps, 2011). They started to build disaster evacuation and prevention infrastructures. However, society in Padang is still living in fear due to *megathrust* earthquake threat estimated to rupture in near future. Society itself shows better response year by year to these kinds of experience. However, they still cannot control their individual actions whenever early warning sirens are activated. As a result, it is reported that accidents happened while people attempting to evacuate using mostly cars and motorcycles (EERI, 2009 & LIPI, 2012). Moreover, **Figure 4.11** illustrates that people in Padang still have problem with awareness about early warning system. Nearly half of the respondents in this survey did not evacuate although they received warning and around a quarter of the respondents claimed that they did not receive any warnings. Resistance from society should be considered by making DM institutions to be more attached to community leaders and finally to the whole society.

4.6. Conclusion

In order to build interpretation for assessment results in chapter five, there are several information need to be reflected from the case study. First, Padang is threatened by both climate change and non-climate change related hazards with three different types of occurrence (recurrent, continuous and singular hazards). Therefore, Padang makes a good context for integrating CCA and DRR in an assessment using adaptive capacity & coping capacity wheel. Secondly, the HFA principles as the main DRR reference in Padang are important to be reflected in coping and adaptive capacity criteria.

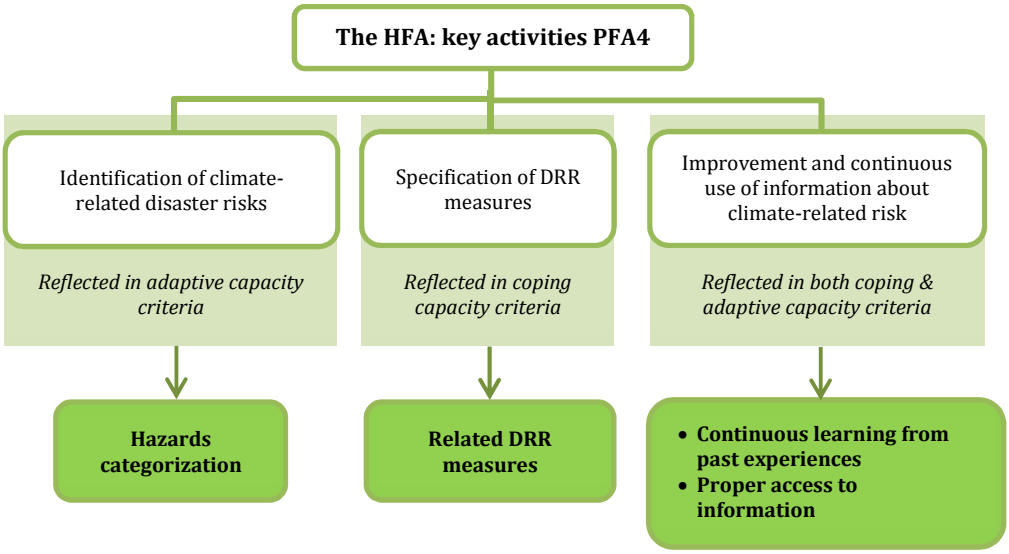

Figure 4.12 Reflection of PFA4 key activities in Padang to coping and adaptive capacity criteria (Source: Author, adopted from UNISDR, 2005)

The HFA principles mentioned in point two are presented in **Figure 4.12**. It gives orientation of the HFA position in coping capacity and adaptive capacity assessment. The HFA key activities reflects "hazards categorization", "related DRR measures", "continuous learning from past experiences", and "proper access to information". Therefore, interpretation of results related to these criteria is linked with the HFA key activities. Third, there is a growing awareness in local implementing agencies about the urgency of adaptation strategies even though it has not been accommodated yet in formal institutions. It is related to two key problems of DRR policies in found in Padang during almost a decade of implementation. Those are unclear legal system and overlapped sectoral polices.

CHAPTER 5

ASSESSING FORMAL DISASTER MANAGEMENT INSTITUTIONS IN PADANG AT MULTIPLE LEVELS

Formal DM institutions in Padang are coded and scored qualitatively in order to answer what are gaps, strengths and weaknesses of formal institutions in three level of government in fostering adaptive capacity and coping capacity of society and local actors in Padang. Using research protocol explained in chapter three, assessment presents the proportion chart first and then explanation of scoring results for each level of government. In the last part of this chapter, overlay technique is used to identify gaps between adaptive capacity and coping capacity wheels in three levels of DM institutions.

5.1 Assessment of Formal Disaster Management Institution at a Local Level

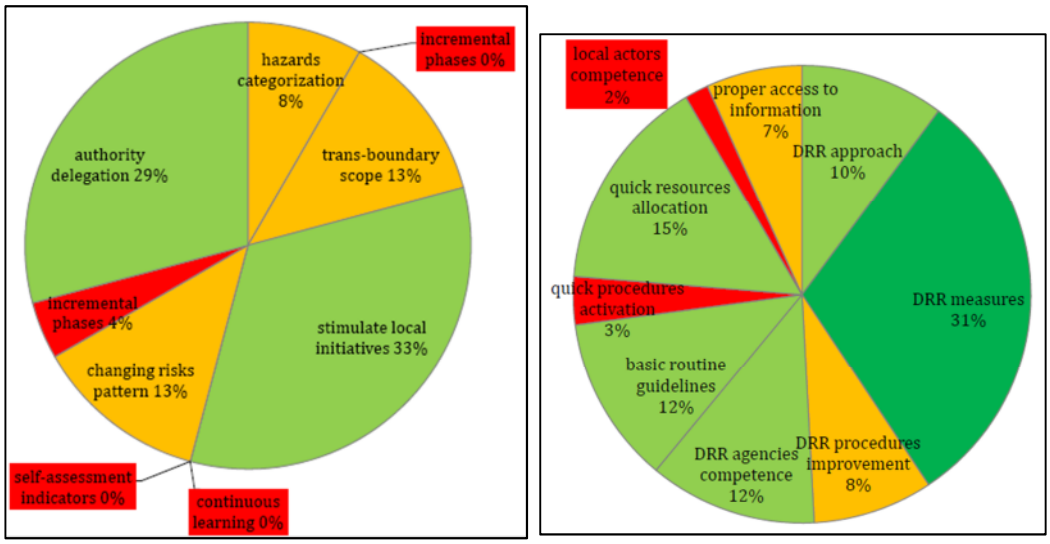

Figure 5.1 Content proportion of adaptive capacity and coping capacity criteria at local DM institution (Source: Author)

Formal DM institution in local level is better in strengthening coping capacity of society rather than fostering their adaptive capacity. Existing institution fails to provide stimulation for society to make be able to adapt with autonomous changes. Formal DM institutions in local level are coded using coping capacity and adaptive capacity dimensions and criteria (see **APPENDIX 1**). To presents the results, **Figure**

5.1 show distribution of quotation percentages for each criterion from a total of six policy documents (include local regulation about city spatial plan). It implies that local DM institutions provide rules of the game dominantly about selected DRR measures, empowerment for society to be more independent, and authority delegation to local actors. In addition, scoring remarks in **Table 5.1** and **Table 5.2** are presented to show how each dimensions and criterion is scored. Subsequent to this table, there are interpretive judgement on strength and weaknesses of each dimension.

Table 5.1 Scoring remarks of local DM institution in fostering local adaptive capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
Variety of adaptation properties **Score = 1/3 = 0.33**	**Hazards categorization**	1	• One point is given for acknowledging different types of natural disasters. To improve the score, potential disasters in Padang still need categorization based on its origin or occurrence. *"Types of disasters which are potentially threats Padang are earthquake, tsunami, liquefaction, floods, land-slide, fire, beach abrasion"* • Commitment in the HFA requires DM policies to explicitly defined type of risks (not just mentioning potential disaster)
	scenario building for dealing with uncertainties	-2	Fails to provide society with adaptation options and may block preparedness of society
	Trans-boundary scope	2	A full score is given due to strong encouragement for society in interdependency and networking. It is shown by using terms like *cooperation, participation, partnership. togetherness, loyalty* and involvement of various actors in all government levels
Learning Capacity **Score = -3/3 = -1**	**stimulate initiatives of local actors**	1	One point is given because involvement mechanism is already there. The only issue is structuring the type of involvement. Here, society involvement is interchangeably considered as *obligation*, *right,* or *opportunity*
	Continuous learning from past experiences	-2	• Fails to stimulate society to learn from experiences and do continuous evaluations related to climate change and non-climate change related disasters • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk
	building indicators for self-assessment	-2	Fails to stimulate society to build self-assessment habit
Room for autonomous changes	**incremental development phases**	-2	Fails to introduce incremental plans to society and may block preparedness of society
	allow changing	1	One point is given because it sufficiently stimulates

Dimension	Criteria	Score	Scoring remarks
Score = 0	**assumptions of risks pattern**		society to be more open-minded to changing DRR approach *"Paradigm shift in disaster countermeasure way of thinking and acting in disaster countermeasure which is applied in Indonesia should be shifted to more effective direction to minimize negative impacts of disaster events"* This criteria missing one point due to "blue print" style of development phases which explained that "Padang Metropolitan" area plans requires development of current city centre (limits adaptation strategies)
	authority delegation to local actors	1	• One point is gained from local implementing agencies that are authorized (such POSDAL) • One point more point is not given for this criteria because unclear roles between POSDAL (local) and PUSDALOPS-PB (province level). *"PUSDALOPS-PB represents the Major in early warning implementation"*

"Variety of adaptation property" of local DM institution

Trans-boundary involvement from various actors and levels is clearly encouraged in current institution, thus it is very relevant to stimulate adaptive capacity building for society and local actors. Soft social aspect such as supporting attitude of togetherness, loyalty and generosity make the message become more persuasive and encouraging for society and local actors. Another attempt shown by the institutions is stimulating cooperation policy to complement the transboundary scope.

Similarly, hazards category exists in current institutions but still calls on category updating and restructuring to make it noticeable for society and local officials. Existing institutions already acknowledged disasters following earthquake (tsunami, liquefaction and landslide). However, aspects of climate change such as influence of sea level rise to tsunami and liquefaction is not yet introduced. Categorizing climate change and non-climate change related disaster (as well as combination between both types) is also absent in current institutions.

Unfortunately, the absent of scenario building might be obstruction for local actors and society to anticipate worst case scenarios. Although different type of disaster are mentioned in current institutions, extreme conditions that might become impact from combination of multi-hazard in coastal city are not exists. Disasters

acknowledged in current institutions imply lack of awareness regarding multi-hazard risks from both climate change and non-climate change related disasters. This absence of awareness obstructs local actors and society in general from recognizing unexpected extreme impact that might be resulted in the future.

"Learning capacity" of local DM institution

Encouragement for society initiatives regarding disaster management exists as obligation for society. There is potentially conflicting statements between rights and obligation of society. In the one hand, society has right to get social and security protection from the government. Meanwhile, society is obliged to perform disaster countermeasures. In order to emphasize society initiatives, further explanation is needed regarding the rights of society to minimize great dependency of society to the government. Inability to learning from the past may potentially obstruct awareness building of society and local actors to learn from experiences. Current institution does not mention any passages about learning from past experience or evaluation of disaster countermeasures in the past events.

In addition, the absence of room for autonomous changes may potentially obstruct awareness building of society and local actors to recognize basic or minimum indicators that should be fulfilled to be able to make necessary adjustment. Current institution does not mention any passages about learning from past experience or evaluation of disaster countermeasures in the past events. This implies that current institution do not give sufficient attention for availability or quality of data series regarding the quality of disaster management strategies that were taken in the past.

"Room for autonomous changes" of local DM institution

Absence of this criterion may potentially obstruct readiness and willingness of local actors and society in performing necessary adjustment related to autonomous disaster impacts. Without introducing incremental development phase to the society, reluctance will more likely embedded in existing socio-economic system.

Current institutions give room for paradigm shift in disaster countermeasures. However, there is a potentially conflicting content that limit the flexibility of future development plans. This limitation is related to land use development plan of Padang city centre. Content related to this plan does not directly imply that it cannot

be adjusted. However, such project requires a great deal of budget and commitment from various stakeholders. Thus, this specific plan will make future development become difficult to be adjusted in case of autonomous disaster impacts. Contents related to this future vision need to mention also about future uncertainty and anticipations for changing hazards pattern.

Authority delegation to local actors is clearly encouraged in current institution through establishment of agencies in community level named POSDAL and KODAL (Controlling centre in district level). These agencies consist of members of community organization which gives rooms for society to take necessary actions. However, there is a potentially conflicting content which states that PUSDALOPS-PB (DRR implementing agency in province level) can be delegated by major to implement analysis procedure and decision making during disaster occurrence. This does not directly imply that authority of community agencies is limited by PUSDALOPS-PB authority. To make ensure delegation to local actors, clear structure of multi-level agencies is important to be acknowledged in each regulation about DRR agency.

Table 5.2 Scoring remarks of local DM institution in strengthening local coping capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
DRR Acknowledgment **Score = 4/3 = 1.33**	**Acknowledging DRR approach**	1	• The HFA sufficiently acknowledged *"HFA … current mechanism is limited to emergency response mechanism"* • One point is missing because there are repetitions of this statement: *"Society protection from disaster impact is government responsibility"*. It is contradictory with community resilient in the HFA approach
	Related DRR measures	2	• *Preparedness* and *mitigation* are relevant to the HFA priority of actions which promotes these long-term measures • Commitment in the HFA requires DM policies to make specific and contextual type of DRR measures.
	Improvement of DRR procedures	1	• *Monitoring, rehearsal, improvement* are applied on emergency response phase & preparedness (short term and long term phase) • Reduction of score is from limited monitoring scope only for planning documents
DRR Operationalization	**Competence of local DRR**	2	Establishment, organization structure and job description of each implementing agency are

Dimension	Criteria	Score	Scoring remarks
Score = 4/3 = 1.33	**agencies**		legalized into a specific regulation. An example, the title of such regulation is: "*Organization Establishment And Work Arrangement Of Local Disaster Management In Padang*"
	Guidelines for basic routines	1	• One regulation is dedicated for describing permanent procedure of disaster-countermeasure in Padang. • *Early warning system* dominates policies about standard operational procedures. It reduce the score because it shows limitation of scope
	Quick procedures activation	1	• There is precise time period (1 minute) mentioned as maximum delay time to contact the Major for activation. *"Decision of disaster emergency status is performed by KODAL Padang based on recommendation from TRC and BPBD quick analysis result"* • The score is reduced due to contradictory statement about information validation from local agencies to the sixth chain in case of miscommunication
DRR resources **Score = 0**	**Quick resource allocation**	1	• "*Back-up system*" for DRR Infrastructure and "*stand-ready fund*" for DRR implementation • Need to emphasize more on the efficiency of quick resource allocation to improve the score
	Competence of local actors	-2	• Fails to provide minimum requirement for local actors in local implementing agencies and may block readiness of society
	Proper access to information	1	• Types of information need to be expanded not only for *early warning system* but also for studies and updating knowledge for example • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk

"DRR acknowledgement" of local DM institution

DRR approach in current institutions is clearly represented by explanation of the HFA as the main reference. However, inconsistency seems to appear in between different regulations. The way the approach explained is also varied. Sometimes it is explicit and sometimes it is implicit and combined with additional principles. Sometimes, the HFA principles are not completely described. For example, spatial plan of Padang only considered mitigation measures, while the HFA also promote prevention and preparedness measures to be integrated in development plans. But this limitation of the HFA is already acknowledged one of the regulations.

Number of relevant quotations shows that local government sees the importance of implementing related DRR measures. Series of DRR measures according to the HFA are clearly articulated throughout different regulations. It consists of complete phases of disaster management (pre-disaster to post disaster phases). Furthermore, current institution does explicitly encourage improvement of early warning system procedures. However, improvement of other DRR procedures is only slightly considered through periodical monitoring. Instruments to improve DRR procedures also need to be introduced to make it applicable and concrete.

"DRR operationalization" of local DM institution

Current institutions support quality of local implementing agencies by providing requirement descriptions for related actors. Description for each agency is, by far, legalized by each different regulation. Although not all have been issued yet, general laws on local DRR suggests that regulation for related agencies should be issued subsequently. Unfortunately, limitation of disaster measures is informed in the beginning of regulation about general DRR procedure. It is related to legislation system in Indonesia that makes necessary regulations are issued in random time (according to approval from legislative bodies). As stated in one of the regulations, disaster countermeasure procedures is still limited on emergency response even though it refers to the HFA. However, current institutions see the importance of providing basic routines for all actors. However, acceleration of legalisation system needs to increase coping capacity of local actors.

In general, attempts to generate quick activation of necessary DRR procedures are clearly articulated. It shows flexibility by maximizing function of existing DRR agencies. However, overall attempt still need to pay attention on command and control procedure through communication network. Relying on vulnerable communication network during disaster events potentially make communication chain becomes difficult. Current regulation mentions that validation of command system should be continued until sixth chain in order to get validation to activate certain procedures (such as early warning activation).

"DRR Resources" of local DM institution

Current system sees the importance of resource back-up system for emergency response (quick resource requirements). Allocation of resource however needs more attention on the speed by reducing bureaucratic chain in local level in case of disasters. Apart from formal institution content, major of Padang is actually in charge to give command for resource mobilization and necessary actions, and it becomes hindrance in practises. Therefore, speed and quick bureaucratic process might be seen as the institutional gap in coping capacity building. However, absence of content related to this criteria, may discourage local actors to perform necessary actions properly. Although current institutions already shows attention for competency of DRR agencies, competency of local actors that play important roles in DRR implementation is not available in current institutions. Without specifying minimum qualification of important role in local level, it will be hard to ensure the expected performance.

Current institutions sees access to information as the rights of society and it is presented in pretty much consistent way between existing regulations. Here, PUSDALOBS-PB (province agency) is in charge for information chain from main sources. Local agencies and society can access the information through announcement. However, related content implies that information announced is focused primarily on early warning announcement and emergency actions. Information that are still missing are related to periodical evaluation results, data series of past experiences and/ or studies related to DRR in Padang that can be accessed easily by society.

5.2. Assessment of Disaster Management Institution in Province Level

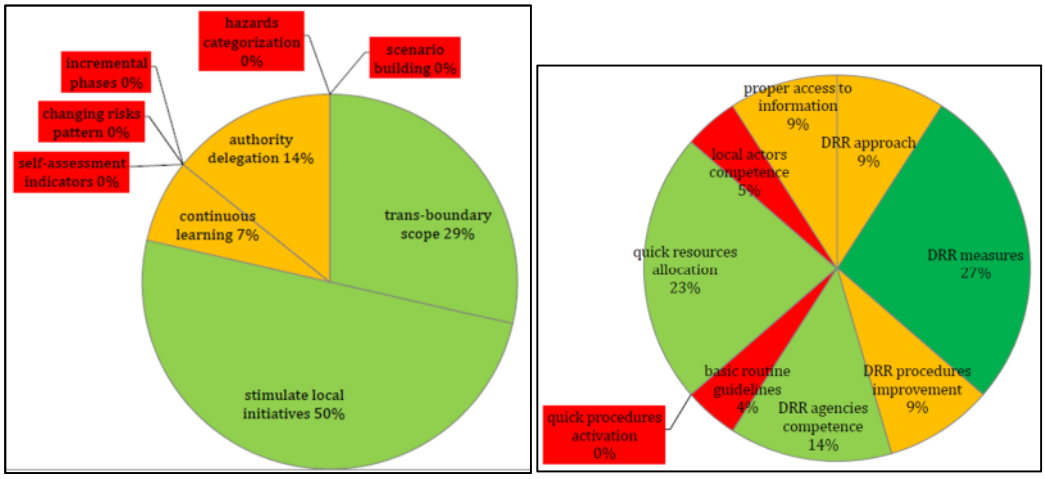

Figure 5.2 Content proportion of adaptive capacity and coping capacity criteria at province DM institution (Source: Author)

Quite similar with results in local level, formal province DM institution also sees the importance of strengthening coping capacity of society rather than fostering their adaptive capacity. Existing institution fails to provide stimulation for society to make be able to adapt with autonomous changes. Formal DM institutions in province level are coded using coping capacity and adaptive capacity dimensions and criteria (see **APPENDIX 2**). To presents the results, **Figure 5.2** show distribution of quotation percentages for each criterion from two policy documents. It implies that province DM institutions provide rules of the game dominantly about selected DRR measures (disaster risk reduction framework) and empowerment for society to be independent. This figure also shows that network governance (transboundary scope) is also dominant. In addition, scoring remarks in **Table 5.3** and **Table 5.4** are presented to show how each dimensions and criterion is scored. Subsequent to this table, there are interpretive judgement on strength and weaknesses of each dimension.

Table 5.3 Scoring remarks of province DM institution in fostering local adaptive capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
Variety of adaptation properties	**Hazards categorization**	-2	• Fails to provide society with knowledge about the actual risks in Padang (climate change and non-climate change related disasters)

Dimension	Criteria	Score	Scoring remarks
Score= -2/3 = -0.67			• Commitment in the HFA requires DM policies to explicitly defined type of risks (not just mentioning potential disaster)
	scenario building for dealing with uncertainties	-2	Fails to provide society with adaptation options and may block preparedness of society
	Transboundary scope (multi-sector, multi-level, multi-discipline, multi-actor)	2	Strong encouragement for society in interdependency and networking. It is shown by using terms like *cooperation, participation,* and involvement of various actors in all government levels
Learning Capacity **Score= 0**	**stimulate initiatives of local actors**	2	• *"Participation"* & "*independency*" principle has a very strong impression regarding this criteria • Society involves is expected to involve in *decision-making, planning, operationalization, maintenance and provision process*
	Continuous learning from past experiences	0	• This related quotation is only in the opening of a policy document. It is hardly noticed by society. "*Learn from previous earthquake and tsunami in 2004…"* • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk
	building indicators for self-assessment	-2	Fails to stimulate society to build self-assessment habit
Room for autonomous changes **Score= -3/3 = -1**	**incremental development phase**	-2	Fails to introduce incremental plans to society and may block preparedness of society
	allow changing assumptions of risks pattern	-2	Fails to draw lesson from gradual change of climate and tectonic patterns. It may block preparedness and awareness of society
	authority delegation to local actors	1	• Responsibility is given to local DM agency. • Score is reduced due to incomplete legal regulations

"Room for autonomous changes" of Province DM Institution

Absence of content related to hazard category potentially obstruct awareness of regional as well as local decision makers in recognizing dynamic of disasters behaviour. As *megathrust* earthquake threats western coastal of Sumatra Island, West Sumatra province needs to make this issue (as well as climate change-related hazards) become more noticeable in regional development plans. Similarly, the

absence of content related to hazard category potentially become hindrance in regional development which is agglomerated in the capital city (Padang). Scenario building need to be introduced and mainstreamed in province level so it can be referred in local DM institutions. Variety of extreme scenarios needs to be socialized to local actors. Province as regional coordinator is sufficiently encourages all parties in all levels of government, other regions and external parties to build partnership and to complement each other in terms of DRR implementations. However, no explicit instrument yet to accomplish this suggestion

"Learning capacity" of Province DM Institution

Independency of society is stated as one of DM principles. Province government through its institutions sees the importance of society involvement in DRR implementation. Without specifying mechanism of society empowerment, this good intention potentially becomes fragmented in project-oriented programs. Furthermore, content related to this criterion is only mentioned as introductory statement. Thus, it is not encouraging local actors to recognize and learn from past experiences. Data series and studies related to DRR performance in past events should be the aim of this capacity. Finally, learning capacity of local actors is potentially stagnant without any assessment tools for evaluation. Although institutions in province level is considered not to be as detailed as local institutions, experts in this level should give more attention in making guideline for assessing capacity of DM agencies or community organization.

"Variety of adaptation properties" of province DM institution

Regional development plans that contain local functions in Padang seem to be fragmented from disaster risk reduction strategy. Padang Bay City as well as development of economic centre in Padang city centre is potentially block awareness of local actors and society to be able to adjust the plan. Apparently, it is shown that rooms for more flexible plans are not encouraged in existing regulations. Adopting the HFA form national institutions, current province institutions seems not concerned about the *megathrust* threats especially in Padang, the province capital. Although this specific phenomenon attracts many disaster experts worldwide, the dynamic behaviour regarding to earthquake threats is only slightly mentioned in introduction of regulation. Although it is mandated in regulation, province institutions still need to introduce structural position of each level of government in

DM (as well as central government). Such information need to be repeated in synchronized manner in each government level so that local actors recognize flexibility from their authority relative to province and national level.

Table 5.4 Scoring remarks of province DM institution in strengthening local coping capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
DRR Acknowledgment **Score = 2/3 = 0.67**	**acknowledging DRR approach**	-2	Fails to introduce the HFA as main DRR reference and may block preparedness of society
	related DRR measures	2	• *Early warning, reconstruction, mitigation, prevention, preparedness* are repetitively explained in detail and it represents the HFA • Commitment in the HFA requires DM policies to make specific and contextual type of DRR measures.
	improvement of DRR procedures	2	• Procedures that have been regulated here are "*emergency response"* procedures. • *"updating emergency response procedures"* is considered crucial
DM Operationalization **Score = 2/3 = 0.67**	**competence of local DRR agencies**	2	Complete qualification of provincial DM agency is presented here as well as leader qualification
	guidelines for basic routines	2	A specific policy about quick respond team in province proofs is already issued with title: *"Permanent procedure of quick respond system in West Sumatra province"*
	Quick procedures activation	-2	Fails to prioritize speed and efficiency in DRR procedure activation and may block society response in emergency situation
DM resources **Score = 4/3 = 1.33**	**Quick resources allocation**	1	• Procedures that have been regulated here are "*emergency response"* procedures. • *"updating emergency response procedures"* is considered crucial
	Competence of local actors	2	Requirements for DM agency personnel are listed clearly in current regulation
	Proper access to information	1	• This institution encourage private sectors to report related information to public • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk

"DRR acknowledgement" of province DM institution

The HFA approach is not mentioned in existing regulation although it is suggested by central government to be adopted in province. It is potentially limit capacity of society and local actors to act according to the actual reference (the DRR through the HFA). It is important to acknowledge the HFA because the HFA is not only about applying certain measures, but it aimed at integrating DRR into local development plans as well as building adaptation strategies. On the other hand, DRR measures are consistently suggested in different DM regulations and it adopts the measures from the HFA. To make it more consistent, presentation of DRR measures should be synchronized with Padang DM institutions. However, it is a good start for province to mention all disaster management phases (pre-disaster to post disaster) to be adopted in Padang DM institutions. Moreover, improvement and updating of emergency response procedures is clearly articulated. Effectiveness becomes the main goal of the improvements. It potentially becomes good example for local actors. As recommendation, procedures besides the emergency responses should also encourage such as evaluation, study or self-assessment procedures.

"DRR operationalization" of province DM institution

DRR implementing agencies in province level are currently fill the role of local agencies that has not been established or established with limited resources capacity. It has been equipped with description of requirement, responsibility and authority so that it can encourage the following local implementing agencies. Thus, it is important to ensure competency of province does not overlap with local agencies. Besides, existing procedures related to basic routines is available for emergency response. It might be seen as an opportunity to introduce the HFA approach to local actors. However, operationalization of procedure activation seems to be forgotten here. Province is currently in charge of emergency response through Major commands and President mandates. It is understandable to have province filling up local government roles that is not yet sufficiently established. However, absence of this criterion will potentially make procedure activations become complicated and overlapped.

"DRR resources" of province DM institution

Resource allocation is already suggested for emergency response. The gap that needs to be confirmed is that the Governor has authority to distribute and allocate

emergency funds and logistics to local government. In case of local disaster occurrence, this mechanism can decelerate the speed of resource mobilization. Besides, description of actor qualification and requirements in existing regulation gives good and clear example for local actors in establishing local DM agencies. Transparency is also promoted and it potentially gives insights for local actors on legitimation to derive information from province. However, content about information is not sufficient enough to trigger provision of proper access for local actors and society.

5.3. Assessment of Disaster Management Institution in National Level

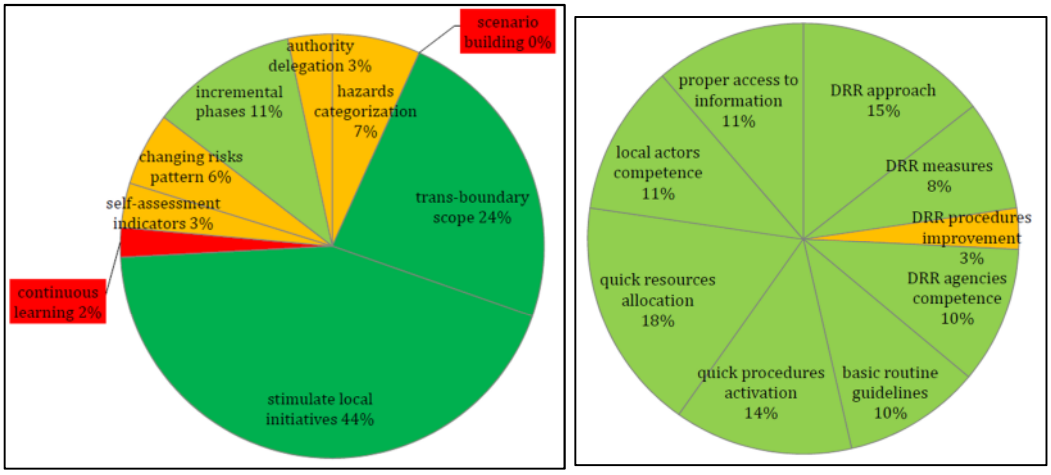

Figure 5.3 Content proportion of adaptive capacity and coping capacity criteria at national DM institution (Source: Author)

Different with local and province levels, formal national DM institution does explicitly encourage society to foster their adaptive capacity and strengthen their coping capacity. Existing institution seems to be more balanced and updated related to the commitment. This might be seen as an opportunity to improve local through strategic pilot projects in local level. Formal DM institutions in national level are coded using coping capacity and adaptive capacity dimensions and criteria (see **APPENDIX 3**). To presents the results, **Figure 5.3** show distribution of quotation percentages for each criterion from a total of seven policy documents. It implies that national DM institutions provide rules of the game in quite balanced manner in terms of coping capacity. However, there are dominant proportions of adaptive

capacity wheel which is empowerment for society to be independent. In addition, scoring remarks in **Table 5.5** and **Table 5.6** are presented to show how each dimensions and criterion is scored. Subsequent to this table, there are interpretive judgement on strength and weaknesses of each dimension.

Table 5.5 Scoring remarks of national DM institution in fostering local adaptive capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
Variety of adaptation properties **Score = 0**	**Hazards categorization**	0	Definition of "*disaster*" in general is not sufficient to stimulate awareness of society and comprehend context of risks in Padang. Thus it barely gives any influence to foster local adaptive capacity (neutral score)
	scenario building for dealing with uncertainties	-2	Fails to provide society with adaptation options and may block preparedness of society
	Trans-boundary scope (multi-sector, multi-level, multi-discipline, multi-actor)	2	Strong encouragement for society in interdependency and networking. It is shown by using terms like *cross-sectoral, "togetherness" principle, partnership, cooperation* and involvement of various actors in all government levels
Learning Capacity **Score= 2/3 = 0.67**	**stimulate initiatives of local actors**	2	• "*Inclusiveness*" principle in society involvement gives a strong impression of empowerment of society in DRR implementation. • "*Decentralization*" gives more opportunity to stimulate local actors. • It is also said that society is the main actor in DRR implementation
	Continuous learning from past experiences	-1	• "Past experience" found in the quotations implies that this evaluation is aimed at a project-oriented assessment rather than a continuous study. • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk
	building indicators for self-assessment	1	• Creating pilot project of "resilient-community", central government equipped society with indicators for assessing community resilience. • To improve this score, coping capacity indicators need to be considered
Room for autonomous changes **Score= 2/3 = 0.67**	**allow changing assumptions of risks pattern**	-1	Integration of DRR into local development plan often misinterpreted as inset which has fragmented program with other sectors. Gap to be fulfilled is knowledge about climate and non-climate change hazards pattern
	incremental development phases	2	• The term "contingency plan" is strongly suggested here, thus full score is given. *"village contingency plan is planning document formulated based on emergency states that are predicted to occur in near future....this plan may not be activated if it is not necessarily*

Dimension	Criteria	Score	Scoring remarks
			needed" • According to the characteristic, "*contingency plans*" are considered as incremental plans
	authority delegation to local actors	1	• One point is given for empowerment of society through community "*Community forums are authorized and has legal certainty to implement DRR measures*" • To improve this score, authority of Pusdalops PB should be transferred to community forums whenever the society ready *"tools and analysis about disaster information is completely PUSDALOPS-PB authority"*

"Room for autonomous changes" of national DM institution

National DM institutions have very general categorization of disaster (natural and man-made disasters). This is too general in order to foster awareness of local actors regarding disaster. This is simply normative and it implies doubt that national institutions contribute to foster adaptive capacity of local actors in Padang. Furthermore, there is no reference available to be adopted by Padang from national DM institutions regarding scenario building for autonomous situations in the future. It seems conflicting for a country that already committed with certain agreement (the HFA). The HFA suggests contingency plans that are periodically updated in all level of government (UNISDR, 2005). Therefore, it is recommended for national DM institution to clearly introduce this approach. The good thing, partnership in DRR implementation is clearly and consistently embraced in national DM institution. It implies that society and local actors has the same role and responsibility as other actors in the higher level of government. Regarding difficulties in the implementation, this can be seen as good opportunity to make local actors become familiar with their role and position relative to other actors.

"Learning capacity" of national DM Institution

Content related to motivation building for local actors and society is easily noticeable in national DM policy documents. Consistent attempt to assist transformation of society from passive to become active actor is noticed. It makes optimistic judgement that national DM policy carefully guides transformation of local actor initiatives. However, persuasion for local actors to learn from past DM implementation is not clearly articulated in existing policies. No explicit content state about maintaining continuous learning besides monitoring by DM agency.

Importance of lessons learned from evaluation is introduced without stimulating local actors as the one that should be empowered the most (based on the HFA). Besides recommending continuous learning process, I also find that suggestion from the HFA; - regular system testing & performance assessment in local level - will be encouraging for local actors. Furthermore, the concept of "resilience village/ sub-district" is introduced along with its assessment. This is a good start in formulating society resilience level through selected indicators. In order to make it applicable, this pilot project should be encouraged to be applied as self-assessment instrument.

"Variety of adaptation properties" of national DM institution

Development-oriented strategy is still mainstreamed within national DM policies. The potential gap that still needs more explanations is the essence of integrating DM in existing development plans. Surprisingly, the term "contingency plan" is repeatedly introduced within national DM policies. Local actors and society in general is the target of the socialization of this planning approach. Therefore, it potentially becomes strong inputs for society. At this time, contingency plan only recommended for one type of disaster. In the future, hopefully contingency plan can accommodate multi-hazard risks (climate change and non-climate change disasters). Moreover, local actors are authorized in DRR implementation through community DM agencies. To make it applicable, authority of province DM agencies should be adjusted and eventually handed over to community DM agencies within learning process from passive to resilience society.

Table 5.6 Scoring remarks of national DM institution in strengthening local coping capacity (Source: Author)

Dimension	Criteria	Score	Scoring remarks
DM Acknowledgment **Score= 4/3 = 1.33**	**acknowledging DRR approach**	1	• One point is dedicated for acknowledging the HFA as main reference and also introducing "*disaster resilient community*" program as a pilot project. • To improve the score, statement that are contradict to the HFA approach should be re-considered, such as: *"Government gives protection for society from disaster threat…* *"Government gives social protection and safety for vulnerable society groups"* Because it gives impression that protection from (uncertain) disaster threats is government responsibility. Meanwhile in the HFA, community is considered as the primary actor

Dimension	Criteria	Score	Scoring remarks
	related DRR measures	1	• *Preparedness, emergency response,* and *mitigation* are DRR measures mentioned and they are relevant with the HFA strategic goals. • To improve the score, commitment in the HFA requires DM policies to make specific and contextual type of DRR measures.
	improvement of DRR procedures	2	Improvement for operation plan of emergency response phase is the main feature in national DRR policies. Improvement in this area is encouraged through "*monitoring*", "*evaluation*", "*daily updating*", and "*regular training*". Thus, full score is given to this criteria
DM Operationalization **Score= 3/3 = 1**	**competence of local DRR agencies**	2	Roles of local agencies are clearly defined as well as their responsibility, authority, and requirements. There are three local agencies described: 1. PUDALOPS-PB as operational agency of DM local agency 2. Quick response team (TRC) which consists of multi-stakeholders 3. Community disaster preparedness team
	guidelines for basic routines	1	A good appreciation is given for complete and comprehensive guidelines for disaster emergency operations (six regulations in total). This criteria can be scored better if there are more routine topic area besides emergency operation such as guideline for evaluation, self-assessment, building indicators, or anything related learning process
	Quick procedures activation	0	• Structure and procedures for disaster emergency response activation is there, especially in explanation about the quick response team. This team has responsibility to do quick study to support quick decision making. "*TRC team supports decision-making in a quick, proper and coordinated way*" • There are restricting aspects such as complicated mechanism of activation by PUSDALOPS-PB as well as delay time to wait for command from national & province DM agency (BNPB or BPBD)
DM resources **Score= 5/3 = 1.67**	**Quick resources allocation**	1	• This criteria is scored as one point for resource mobilization plan in the "*community disaster countermeasures plans*" (RPB Desa/ kelurahan). "*Logistic distribution in emergency response is implemented based on actual dynamic…"* • Potential hindrance for these criteria is bureaucratic chain for allocating logistics that different level of government that might get involved in the process. They might have different interests and overlapped procedures.
	Competence of local actors	2	It is stated that "*actor capacity*" assessment is defined as *resources owned by individuals, households, and community to:* - *cope with* - *prepare* - *reduce risks* - *recover* Similar to most criteria in this wheel, qualification for

Dimension	Criteria	Score	Scoring remarks
			actors in DRR implementation is focuses on emergency response phase.
	Proper access to information	2	• Full score for this criteria is given for statements that not only shows importance of information but also considering effectiveness and speed of information distribution and access *"A DRR agency manager investigates source of communication failure"* *"…establishing communication network"* • Commitment in the HFA requires DM policies to make improvement and continuous use of information about climate-related risk

"DRR acknowledgement" of national DM institution

The HFA approach seems to have some adjustments in national DM policies. More normative principles such as environmental protection, social, economy, effectiveness and others are integrated as DM approach. It seems clearer if the policy documents acknowledge the HFA explicitly, so that people can refer to the actual reference documents and make comparison. Furthermore, disaster countermeasure is limited in terms of disaster management phases. DM policies are now still focusing on emergency responses. In order to make this criteria more complete, DM policies should acknowledge related measures and try to make it more structures and consistent between policies. Although it is still limited for emergency procedures, national DM policies clearly encouraged monitoring, evaluation, updating, improvement, testing and training. This should become strong input for local DM polices.

"DRR operationalization" of national DM institution

National DM policies are more complete than province and local. One example is how central government give clear explanation of the required competencies. Overall, national DM policies are dominated by guidelines for basic routines. This is potentially has strong influence for local actors if central government encourage more to local government to adopt the guideline and adjust it based on local context. National DM policies imply that procedures activation has its own mechanism which makes it questionable in terms of how fast important procedures are activated. It is also implied that command and control in DM system is hardly to be involved by society.

"DRR Resources" of national DM institution

Mechanism of resource allocation in overall is encouraging for local actors. However, contents related to this criterion seem to be overlapped to each other due to long and complicated chain of command and control system within multi-level DM institutions. Long bureaucratic chain need to be simplified during disaster occurrence. Moreover, complete description of local implementing agencies is also well-articulated in DM national policies. This can be seen as opportunity to be insight for local DM policy to be consistent in describing qualification of important actors in DM agencies. Finally, local actors and society and general become vocal point of providing proper access to information. This potentially encourages local actors to be informed during disaster occurrence. To sustain such empowering idea, information which is not related with emergency phase should also introduced, especially information related to data series from past DRR experiences (as well as related studies).

5.4. Gaps between Multi-level Disaster Management in Padang

After identifying strengths and weaknesses, this research continue the exploration to find out the gaps between the multi-level formal DM institutions in Padang. **Figure 5.4** shows comparison of all coping capacity and adaptive capacity wheels from three level of government. However, it is difficult to compare through six wheels at a time because the wheel is more effective to be presented as one wheel. The gaps I would like to explain as result is either distortion or reduction from national level to local level (or the opposite). I come up with the idea of using overlay technique to stack up three wheels from different level and find the missing or different gaps using the colour scheme.

Table 5.7 Content gaps in multi-level DM institutions in Padang
(Source: Author)

ADAPTIVE CAPACITY			
DISTORTED CRITERIA		**CONSISTENT CRITERIA**	
National to Province	**National to Local**	**Overall strengths**	**Overall weaknesses**
1. Allow changing assumptions of risks pattern 2. Incremental development phases 3. Building indicators for self-assessment	1. Incremental development phases 2. Building indicators for self-assessment 3. Continuous learning from past experiences 4. Stimulate initiative of local actors	1. Authority delegation to local actors 2. Trans-boundary scope	1. Scenario building for dealing with uncertainties
COPING CAPACITY			
DISTORTED CRITERIA		**CONSISTENT CRITERIA**	
National to Province	**National to Local**	**Overall strengths**	**Overall weaknesses**
1. Acknowledging DRR approach 2. Proper access of information 3. Competence of local actors	1. Improvement of DRR procedures 2. Proper access of information 3. Competence of local actors	1. Competence of local DRR agency 2. Quick resources allocation	*Not identified*

Distorted criteria from national level to local level

National level play role as precedence for lower level of government. In Padang case, national DM institution shows DRR using the HFA as principles (the PFA4) that has to be adopted. However, adoption of this approach is distorted either in province or local level. For example, **Table 5.7** shows criteria that are distorted and consequently it can be used as insights to synchronize the three levels and make them consistent. In terms of adaptive capacity criteria, national introduced "contingency plans" to be adopted in local policy. However, there is no acknowledgement found for such plans in local DM institution. Another example of a clear distortion is how central government socialized "resilient community" indicators and also indicators to evaluate performance of local DM institutions. Unfortunately, there is no assessment indicators found in local DM policies. Similar distortions are also shown in stimulating initiatives of local actors and learning from past experiences. In terms of coping capacity, there are also distortions from national to local level in three areas. However, the gap is not as wide as distortions in adaptive capacity. Distortion in coping capacity is mainly due to number of derivative policies that describes guidelines for DRR routines. National has complete guidelines that are ready to be adopted for local actors.

Consistency of criteria from national level to local level

Assessing multi-level context of DM institutions create urgency to fill the gap between levels of institutions. Information about overall weaknesses gives insights on identifying the root of major weaknesses as well as strength. "Scenario building for dealing with uncertainties" is identified as overall weaknesses among all criteria. It means, central government as the main reference for local level is not able to introduce this adaptation property to local actors. Thus, it calls for big institutional reformation especially in spatial or development planning started in national level. The HFA indeed does not explicitly suggest scenario building in its core principles to its member states. This could also be the reason why scenario building logics have not been mainstreamed yet in national and regional development plans.

Apart from that, there are four strengths which are consistently encouraged in three levels government. Regarding adaptive capacity criteria, authority delegation to local actors and cooperation between various stakeholders are articulated clearly in each policy. It shows broad acceptance and understanding about the importance of involvement of local actors and interdependency between actors in different levels of government, different social group, and different administrative boundaries. Furthermore, there are two consistent criteria of coping capacity found within three levels of government. It seems that there is a growing awareness in each level of government about setting basic roles, responsibilities and authorities of local DRR agencies as well as providing proper access to information during emergency response. Of course there are still improvements to be made, such as type of information expected to be shared is continuous assessment results and studies about specific risks in Padang.

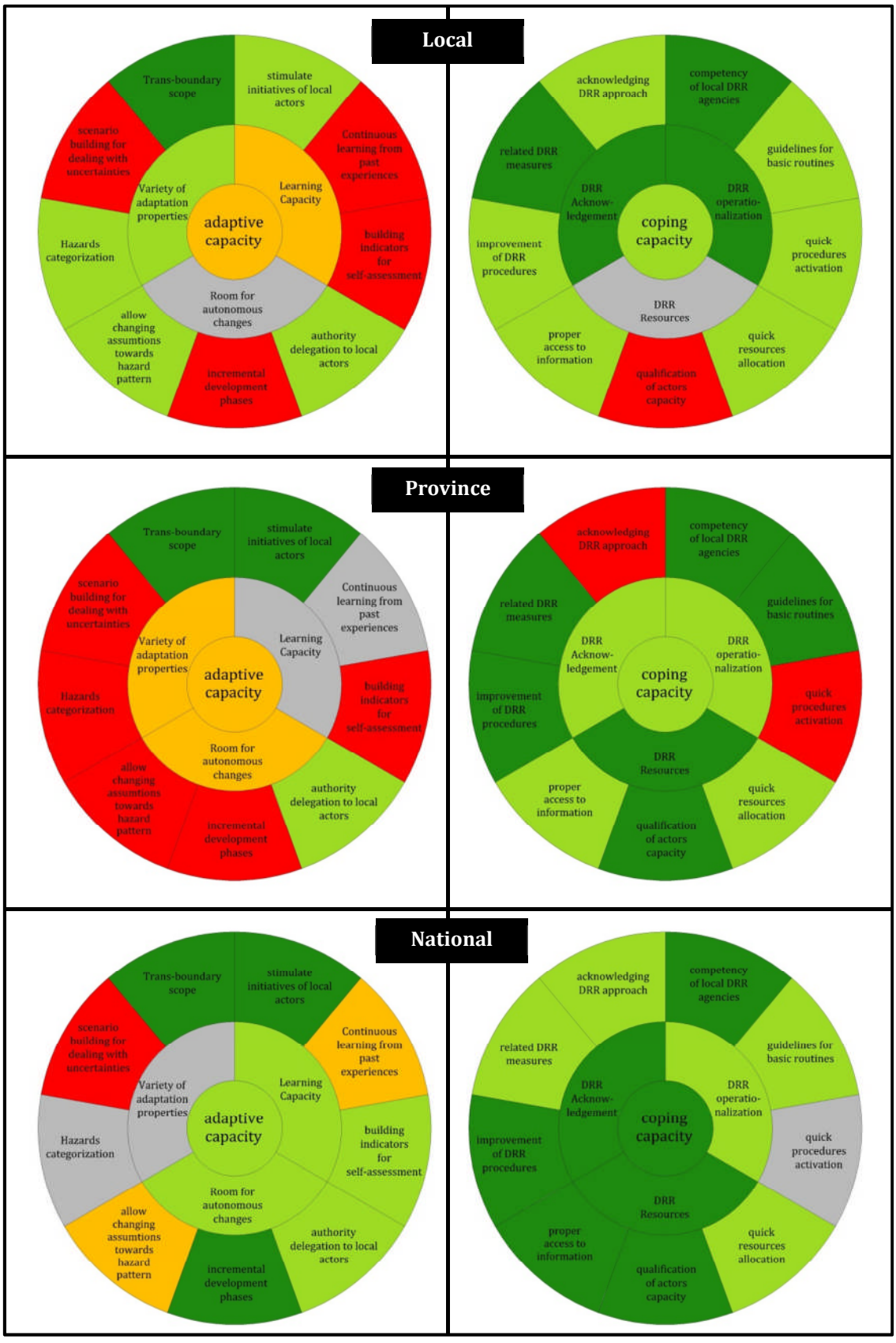

Figure 5.4 Adaptive capacity and coping capacity wheels of three levels of DM institutions in Padang (Source: Author)

CHAPTER 6
CONCLUSIONS

Interplay between increasing extreme climate behaviours increases vulnerability of delta cities and coastal cities in Asia. Climate change adaptation research field is focusing on making flood resilient cities for delta cities that are currently threatened by increasing frequency of floods and storms. However, there are delta cities in Asia that not only threatened by climate-related hazards but also non-climate related hazards. Consequently, integration between disaster risk reduction and climate change adaptation is considerably expected due to uncertainty in changing risks pattern. Padang is one example of a delta city in Indonesia that severely threatened by multi-hazard risks including combination between hazards. Although Padang has adopted the Hyogo Framework for Actions since 2005, disaster management in Padang is challenged by urgency to make crucial adjustment in its disaster management institutions. Therefore, it is important to identify the quality of existing DM policies in order to recognize the problem areas, strengths and gaps within many DM policies. For example, using the case study of Padang and the context of formal disaster management, I asked main research question for my research.

What are the gaps in multi-level disaster management in Padang by assessing the roles of formal institutions in stimulating adaptive capacity and strengthening coping capacity of society?

After coding, scoring, interpreting and presenting the policy documents, conclusions are drawn in form of empirical and theoretical reflections. This study aims at exploring assessment of formal institution in fostering adaptive capacity and strengthening coping capacity of society to accommodate multi-hazard risks and DRR context. Subsequently, this study also expects to identify strengths, weaknesses and content gaps of disaster management policies in case study of Padang, a tectonic-hazards prone delta city. Empirical reflection summarizes findings from chapter five and infers latent and restricting contents in DM policies in Padang at three different levels that calls on policy improvements. Meanwhile, theoretical reflection focuses on linking findings in chapter five with major debates in two field of research, DRR and CCA.

6.1. Empirical Reflections

6.1.1. Strengths and Weaknesses of Formal DM Institutions in Padang at Local, Province and National Levels

- Sub-question 3: *To what extent do the formal disaster management from local, provincial and national level in Padang fulfil the criteria in fostering adaptive capacity and strengthening coping capacity of society?*

According to assessment result that is summarized in **Table 6.1**, DM institutions in local level is relatively strong in terms of coping capacity, while it has low score in adaptive capacity. Main problem identified in local level is disaster management resources are not sufficiently seen as importance aspects. Moreover, the most vulnerable aspect in local level is related to learning capacity of society. Current institutions potentially obstruct capacity of society to learn from past experience and recognize their own capacity. However, it potentially encourages society to be independent and building partnership in terms of DRR implementation. Regarding awareness to multi-hazard risks, society is prepared with introduction to multi-hazard. Therefore, society still needs to be aware of combination of climate-change and non-climate change related hazards in the future as well as characteristic of disaster occurrence. Overall, local DM policies in Padang still need considerable improvement to make it more flexible to perform adaptation strategy.

Table 6.1 Strengths and weaknesses of local DM institution in fostering local adaptive and coping capacity in Padang (Source: Author)

LOCAL DM INSTITUTION	
ADAPTIVE CAPACITY	
STRENGTH	**WEAKNESSES**
1. Trans-boundary scope	1. Scenario building for dealing with uncertainties 2. Continuous learning from past experiences 3. Building indicators for self-assessment 4. Incremental development phases
COPING CAPACITY	
STRENGTHS	**WEAKNESSES**
1. Competence of local DRR agencies 2. Related DRR measures	Competence of local actors

Moreover from the assessment result, it can be seen that DM institutions in province level has the lowest score on adaptive capacity dimensions as well as on coping capacity. It is potentially trigger negative influence to local actors because legal system in Indonesia requires local policies to adopt national and province policies. In order to ensure consistency of the HFA approach in multi-level DM in Padang, DM institutions in West Sumatra Province need improvements especially in providing variety of adaptation strategies, stimulating learning capacity and allowing room for change especially for regional economic development plan involving Padang as its capital city (see **Table 6.2**). Government of West Sumatra Province seems to underestimates the *megathrust* threats in its regions. As explained, in the previous chapters, this province has the most regions that are located in the most unstable earth plates in Indonesia. Normative directives are not sufficient enough for this condition. Scenario building and more flexibility in current system should be mainstreamed within DM institutions to be adopted clearly by local actors in Padang.

Table 6.2 Strengths and weaknesses of province DM institution in fostering local adaptive and coping capacity in Padang (Source: Author)

PROVINCE DM INSTITUTION	
COPING CAPACITY	
STRENGTHS	**WEAKNESSES**
1. Related DRR measures 2. Improvement of DRR procedures 3. Competence of local actors 4. Competence of local DRR agencies 5. Guidelines for basic routines	Acknowledging DRR approach (not mentioning about the HFA as the main DRR reference)
ADAPTIVE CAPACITY	
STRENGTHS	**WEAKNESSES**
1. Trans-boundary scope 2. Stimulate initiatives of local actors	1. Scenario building for dealing with uncertainties 2. Hazards categorization 3. Allow changing assumptions of risks pattern 4. Incremental development phases 5. Building indicators for self-assessment

Fortunately, national DM policies show good results in both adaptive capacity and coping capacity wheel. This implies that central government gives sufficient attention to assist regional and local governments in performing both coping and adaptation strategies under the HFA as reference. Central government sees the importance of resilient community to anticipate extreme conditions in the future

due to climate change and non-climate change related hazards. Although central government introduces contingency planning approach, scenario building is still missing to be socialized to local actors. Stimulation for society to continuously learn from past experience also needs to be mainstreamed in existing DM policies (see **Table 6.3**). As the highest level of government, central government should be able to measure timing of learning process. Whenever local capacity is already sufficient to implement DRR in resilient way, then authority of local DRR agencies in province and national level should be reduced and handed over to local actors. Technical assistance and physical aids for local actors should be monitored and accelerate according to local progress. Therefore, DRR strategies should not be treated as project-oriented plans.

Table 6.3 Strengths and weaknesses of national DM institution in fostering local adaptive and coping capacity in Padang (Source: Author)

NATIONAL DM INSTITUTION	
ADAPTIVE CAPACITY	
STRENGTHS	**WEAKNESSES**
1. Trans-boundary scope 2. Stimulate initiatives of local actors 3. Incremental development phases	1. Scenario building for dealing with uncertainties 2. Hazards categorization
COPING CAPACITY	
STRENGTHS	**WEAKNESSES**
1. Quick DRR procedure activations 2. Proper access to information 3. Competence of local actors 4. Competence of local DRR agency	Quick procedures activation

Finally, reviewing the results of distortion in multi-level DM institutions in Padang, it can be concluded that there are more criteria that are distorted from national to local rather than criteria that are consistently adopted. This implies that the HFA 2005-2015 need to be further examined especially regarding to institutional capacity of three level of government in translating and articulating the HFA principles. With another two years to go for this commitment to be implemented, this country still has a lot of homework to fix in order to implement the HFA consistently. From overall weaknesses of three level governments, "scenario building for dealing with uncertainties" is the weakest point in all three levels. Similar strengths identified in three levels are mostly normative criteria such as "authority delegation to local actors" and "trans-boundary scope". To sum up, multi-level DM institutions in Padang need improvements in making current institution to

become flexible enough to stimulate society to be adaptive towards uncertainty of multi-hazard risks.

6.1.2. Policy Recommendations of Formal Multi-level DM Institutions in Padang

- Sub-question 4: *Which content gaps can be identified and which policy recommendations can hence be derived for multi-level formal disaster management in Padang?*

There are ten policy recommendation proposals that are synthesised from the findings of this study as follows:

1. Local, national and province DM institutions need to recognize more specific categorization of natural disaster based on actual dynamics of multi-hazard risks that threatened Padang.
2. National DM institution needs to suggest regional and local government to consider and elaborate multi-hazard risks with the pattern and characteristics of both climate-change and non-climate change disasters.
3. National DM institution needs to suggest regional and local government to consider key uncertainties in scenario building related to cope and/or adapt with multi-hazard risks.
4. Central government need to ensure that society has the highest responsibility towards planning and implementation local DRR. Therefore, government is no longer necessary to hold the highest command position in DRR implementation.
5. In order to stimulate initiatives of local actors to become applicable in local level, national government should synchronize this suggestion with giving clear authority to local actors in DRR implementation. Command and control system in multi-level government is no longer relevant to stimulate society initiatives.
6. National government funds pilot projects on evaluating development programs from different sectors that related to past events. The results have to be socialized to society along with concrete recommendations for future improvements and integrate recommendations in existing strategic plans (RTRW and others). National government encourage local actors to consider self-assessment is more important and effective than assessment by external actors (ministries, national agency, and others).

7. In order to make assessment indicators from the HFA and central government become more practical and understandable for local actors, national government needs to restructure these instruments into sequential evaluation based on different disaster risk assumptions.
8. Integration of DRR in development plan needs to be strengthened by anticipating unknown changes in short-term and long-term risks pattern and allow adjustment of development plan according to current urgency. In this case, changing geological behaviour in centuries and accumulation of sea level rise have to be acknowledged and introduced properly to society.
9. National DM institution needs to suggest regional and local government to make contingency plans not only for emergency response but also for spatial plan and development in general. In Padang case, there are some recommendation to be concerned:
    a) Hierarchical legal system and decision making process related to spatial planning and development strategies have to be adjusted based on actual necessity when disaster events occur. It means accelerate legalization process of action plan in emergency situation and minimize long bureaucratic procedures to be more effective and efficient. Reduce the length of bureaucratic procedures does not mean lowering existing standards but increase knowledge, performance and technology to do necessary procedures.
    b) Multi-level government requires local actors to adopt national and province policy. It potentially creates conflict with "authority delegation to local actors" criteria. However, it can be useful for developing incremental planning method if central government and province government fully encourage and give room for local contingency plan. Role of central and province governance is to give assistance for local actors' consideration. Thus, central and province government support local decision by encouraging, providing necessary technical assistance as well as pilot projects. Although central and province government have their own general plans and strategic plans, it should have minimum intervention in local development planning (especially decision on critical function and network in the city).
10. "Authority delegation to local actors" needs to be supported with improvement in "learning capacity" dimension. Legal status for delegation to local actors

should be complemented with clear authority description and limitation of government authority in local/ communal decision making. Community based planning and implementation could be an example, but with government assistance before society is ready to be self-organized in terms of deciding DRR or adaptation strategy.

6.2 Theoretical Reflections

6.2.1. Contributions for CCA and DRR Fields of Research

- Sub-question 1: *What are important dimensions and criteria of coping capacity and adaptive capacity to assess formal institutions in a disaster management context?*

Besides DRR measures, the likelihood is very high that adaptation strategy is hence a requirement to reduce multi-hazard risks in a complex socio-ecological system such as a tectonic-disaster prone delta city. Therefore formulating dimensions and criteria of coping capacity and adaptive capacity helps to gain better understanding of CCA topic. CCA used to be associated with climate-related disasters such as flood and storm. Contextual hazards categorization and recognition of short-term and long-term changing multi-hazard risks pattern (whether it is climate-change or non-climate change related) is the main feature of the new adaptive capacity wheel to fill the gap in knowledge about coping and adapt with multi-hazard risks and vulnerability reduction. This helps orientate that besides DRR strategies, "vulnerability reduction" also calls on adaptation strategy, adaptive institution and adaptive capacity of society.

The new adaptive capacity wheel and coping capacity wheel contributes new point of view of problem definitions that could be happened in delta or coastal cities. Six dimensions and 18 criteria of the new wheels is a breakthrough in assessing the role of formal institutions in fostering not only adaptive capacity but also strengthening coping capacity of local actors and society in general. Specifically, it proposes an insight for debates about possibility to build adaptive capacity on existing coping capacity (Berman, et al., 2012). Even the World Risk Report in 2011 (Birkmann, et al., 2011) consideres the relation between adaptive capacity and coping capacity as a

trade-off. Meaning that the role of coping capacity is not necessary if society already prepared with adaptive capacity in the first place. Therefore, they implies that coping capacity is a different property apart from adaptive capacity and both capacities are more likely to be an options. However, findings in this research gives different perspective and challenge people to re-think about adaptive capacity.

This study is conducted under DRR context which gives an insight that coping capacity can actually be the important property of adaptive capacity. In terms of multi-hazard risks, it propose a complementary relation between both capacities. Disaster risk reduction in the disaster management cycle framework suggests various measures form response to preparedness (W. Nick, 2008). In this study, DRR measures is considered as coping capacity criteria and a set of measures for each disaster management phase represents a coping capacity. Thus, if a city already has institutional framework regarding all phases in the disaster management cycle, it potentially contributes in providing variation of adatation options. These options considered as coping capacities that incterchangeably used, combined ot adjusted whenever changes is required. Therefore, formal DM institutions should become an umbrella for managing and strenghtening coping capacities while also providing flexibility to perform adjustment at any urgent circumstances.

This study also implies the important of adjusting formal institution as a new solution to avoid high-transaction cost in establishment of new regulative institution (Pahl-Wostl 2009). Therefore, the new AC and CC wheel is targeting on policy-makers and government officials who deal with DM policy-making and formal institutions. The previous applications of the original ACW usually involve interview result from stakeholders or experts as primary data. The new wheels are compatible with using policy document as primary data and do content analysis using the help from qualitative research software. Both wheels should be used as one integrated assessment of any DM institutions. Using it separately can create biases and multi-interpretation of dimensions and criteria of both capacities. These wheel aims at identifying coping capacity and adaptive capacity because both capacities are important in order to understand interplay between both capacities. In addition, it is suggested to do peer-assessment using both wheels to ensure the credibility of the results.

6.2.2. Linking Adaptive Capacity Wheel and Coping Capacity Wheel to DRR Reference

- Sub-question 2: *To what extent the reference of current disaster management policies in Padang reflects criteria of adaptive capacity and adaptive capacity?*

The Hyogo Framework for Actions is the main reference of disaster management policies in Indonesia. Central government mandates this commitment to provincial and local government through multi-level disaster management framework. Padang as a delta city with multi-hazard risks has undergone disaster risk reduction attempts since the 19th century and still focuses merely on emergency response phase for earthquake and tsunami until today. It implies that local government of Padang are somehow distorted from the actual HFA principles. Having a focus on the fourth priority for actions (PFA4), the HFA implementation in Indonesia prioritizes reduction of underlying risks factors.

Core indicators of the PFA4 show that the HFA represents the needs for adaptive capacity and coping capacity in DRR. There are three indicators from the PFA4 that can be reflected from findings in analysis chapter. From the three indicators, it can be inferred that within almost a decade, Padang shows little commitment to PFA4 and the HFA in general.

1. Identification of climate-related disaster risks is evaluated from "hazards categorization". In average the three levels of DM institutions are show little awareness of recognizing multi-hazard risks and its changing dynamics. The average score implies that it is one of the gaps that needs to be filled to counteract negative effect on AC or CC of society
2. Specification of DRR measures is evaluated from "related DRR measures". According to findings in chapter five, this criterion is identified as strength. In average, three levels of institutions show give very close attention to availability of DRR measures. Thus, it potentially contributes in strengthening coping capacity of society and good implementation of the PFA4.
3. Improvement and continuous use of information about climate-related risk is evaluated from "continuous learning from past experiences" and "proper access to information". Padang should mainstream routines that are related to studying past experience in order to make better implementation of the PFA4.

However, a good basis for providing proper access to information is already emphasized in existing institutions.

6.3. Methodological Reflection and Recommendation of Further Research

6.3.1. Methodological Reflection

This study uses the qualitative content analysis (the QCA) to derive interpretive results from textual policy documents. A QCA research protocol adopted from Gupta et al. (2010) is applied and presented in transparent manner within this research. According to Berg (2001), content analysis process gives flexibility foo researcher to use non-reactive sources such as interviewing respondents. Instead, content analysis is benefited from opportunity to draw scientific findings from textual data series like newspaper or other textual, image, video or audio documents. In this research context for example, content of policy documents is pretty much speak for itself in order to derive conclusion for improvement of the assessed institutions.

Not much previous applications of the original ACW since it is just introduced by Gupta and her colleagues in three years. From previous application, researcher uses interview technique to stakeholders to gain their personal opinion of institutions performance and then analyse the interview transcript using QCA method. However, in this study I use different approach to give insights for individual coders (especially policy makers and government officials) that need to conduct self-assessment of their policy products. However, the QCA as analysis tools is limited when it is used as a complete research strategy. This method should be combined with semantic judgement to minimize irrelevant statements in the coding process (Berg, 2001 and Zhang, et al, 2009).

In more specific, there are other limitations of this research. The best way to explain the limitation in the QCA is proposed by Lincoln and Guba (1985). They developed four criteria to evaluate an interpretive research (Zhang, et al., 2009).

1. Credibility and conformability shows transparency of the process (coding, scoring and interpreting data) and how the proposed wheels and protocol can be understood by readers or other researchers. This research undergone steps

of research protocol that show transparency in data coding, scoring and interpreting process. Clear protocol, dimensions and criteria also helps coding process because this study uses policy documents. Although policy documents are relatively easier to be coded than interview transcripts, it is more credible and conformable for further research to involve two or three people to do peer-assessment until the judgement is overall logical and understandable.

2. Transferability is evaluated from how applicable is the coping capacity and adaptive capacity wheels for other contexts. This research is dedicated for certain context of disaster risk reduction in coastal cities. There are urgency to differentiate between adaptive capacity and coping capacity in this context. Limitation is related to dimensions and criteria that are already specified DRR as coping capacity context. Therefore, further research using both coping and adaptive capacity wheel may adjust criteria and examples of both wheels to match any contextual urgency. For example, it might be useful to apply it for assessing performance of organizations or spatial plans in fostering adaptive capacity of society.
3. Dependability represents consistency of coding, scoring, and interpretation process within three levels of DM institutions. Similar to credibility, this research is limited in the way it does not provide peer-assessment from other posipeople. Although the process is already transparent, consistency is important to draw conclusion and recommendation because it can influence our perception.

6.3.2. Recommendation of Further Research

Assessing roles of formal institutions in fostering adaptive capacity and strengthening coping capacity of society is just one step to further confirmation that coping capacity is a property of adaptive capacity, therefore both are crucial to be recognized within a system and improved in an integrated way (especially formal system as the legal guidance for social practise). Aiming at future implication to vulnerable cities that disaster management is no longer separated as a sector but to be positioned together with climate change adaptation. It is interesting to have more confidence that DRR measures can be harnessed to enrich variety of adaptation strategy. Therefore, I mostly recommend following studies that explore whether embedded coping capacity in society (formal or informal) become hindrance or become valuable resources for fostering adaptive capacity.

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APPENDIX 1:
Coding and Scoring from Primary Documents of Local DM Institution

AC DIMENSION	AC CRITERIA	QUOTATIONS
Variety of adaptation properties Score = 1/3 = 0.33	**Categorizing hazards**	Determination of disaster status and level should include indicators as follow: e. social and economy impacts
		Vulnerability and resiliency towards natural disaster
		Types of disasters which are potentially threats Padang are earthquake, tsunami, liquefaction, floods, land-slide, fire, beach abrasion
	scenario building for the uncertainties	*No related quotation found*
	Transboundary scope (multi-sector, multi-level, multi-discipline, multi-actor)	Disaster countermeasure is aimed to: c. guarantee operationalization of disaster countermeasure in planned, integrated, coordinated and holistic manner d. appreciate local culture e. build public-private participation and partnership f. support attitudes of togetherness, loyalty and generosity
		c. implementation of cooperation policy in disaster countermeasure with province and/ or other regions/ cities
Learning Capacity Score = -3/3 = -1	**stimulate initiatives of local actors**	Society have rights as follow: d. to participate in planning, implementation and maintenance of health facility provision program including psych-social support e. to participate in decision making related to disaster countermeasure activities, especially related to individual and their community f. to supervise based on existing mechanism in disaster countermeasure implementation
		Society have obligation as follow: b. to perform disaster countermeasure activities
		Community organization has rights as follow: a. to get opportunity to perform disaster countermeasure activities
		Community organization has obligation as follow: a. to coordinate with local government. province and/ or local disaster countermeasure agency related to their involvement in disaster countermeasure activities b. to inform and report to authorized agency about collection of goods and fund to help disaster countermeasure activities
		Central and local government support society participation in fund provision which is derived from society itself
		Society has right to get social and security protection especially for vulnerable group
		Society have rights as follow: b. to get education, training and skills in disaster countermeasure implementation
	Recognize and evaluate past experiences	*No related quotation found*

AC DIMENSION	AC CRITERIA	QUOTATIONS
	building indicators for assessment	*No related quotation found*
Room for autonomous change Score = 0	**incremental development phase**	*No related quotation found*
	allow changing assumption towards hazards pattern	Disaster countermeasure are aimed to: a. give provide protection to society from disaster threats b. synchronize existing laws and regulation
		city service center plan consists of: a. first decade: city center is developed to recover economic condition in Padang which decline as a result of earthquake event b. second decade: city center is developed to integrate development of Metropolitan Padang and its surrounding regencies
		2) Paradigm shift in disaster countermeasure way of thinking and acting in disaster countermeasure which is applied in Indonesia should be shifted to more effective direction to minimize negative impacts of disaster events. Such paradigm shift basically consists of shifting: a. fatalistic-reactive to planned-proactive b. emergency response phase to disaster management cycle c. centralized to decentralized (autonomy) d. government-centric to participatory Thus paradigm shift is based on assumption that: a. protection is basic human right b. disaster risk reduction is inseparable part of development"
		Authority of local government in operationalization of disaster countermeasure are: a. legalization of disaster countermeasure policies in Padang which is synchronized with local development policy
		Considering: b. natural disaster event which hit Padang in 2009 change spatial function and city development, thus it is necessary to arrange Revision of General Spatial Plan of Padang
		in particular condition related to big scale natural disaster,..., general spatial plan of Padang can be re-examine more than one time in 5 years
	authority delegation to local actors	Local government or local disaster management agency and actors in disaster countermeasure may perform for society needs if there is disaster risk indications which are experienced by society
		permanent procedure is formulated based on single integrated command, procedure and organization
		Major has authority to: a. delegate implementation of analysis procedure and decision making to PUSDALOPS-PB b. delegate decision for deploying dissemination of evacuation warning and direction to PUSDALOPS-PB
		PUSDALOPS-PB represents the Major in early warning implementation
		a) Controlling center in district level (POSDAL) District POSDAL is field controlling center which operates in impacted district and has responsibility to head of KODAL operation division whose members are

AC DIMENSION	AC CRITERIA	QUOTATIONS
		district community organization
		KODAL operation division whose members are district community organization b) Controlling center in sub-district level Sub-district POSDAL is field controlling center which operates in impacted sub-district and has responsibility to head of KODAL operation division
Overall adaptive capacity score of local DM institution in Padang = [(-1) + 0 + 0.33]/3 = -0.67		

CC DIMENSION	CC CRITERIA	QUOTATIONS
DM Acknowledgment Score = 4/3 = 1.33	**availability of DM approach(es)**	Disaster countermeasure principles in Padang municipality are: a. quick and proper b. prioritization c. coordination and integration d. purposive capacity and succession e. transparency and accountability f. partnership g. empowerment h. non-discriminative i. non-religious association
		Disaster countermeasure are aimed to: a. give provide protection to society from disaster threats b. synchronize existing laws and regulation c. guarantee operationalization of disaster countermeasure in planned, integrated, coordinated and holistic manner d. appreciate local culture e. build public-private participation and partnership f. support attitudes of togetherness, loyalty and generosity g. create peace in social and national life
		Disaster countermeasure are implemented based on four aspects as follow: b. environmental preservation c. profitability and affectivity
		Responsibility of local government in operationalization of disaster countermeasure are: b. society protection from disaster impacts c. disaster risks reduction and guide it through development programs and early warning system
		Local disaster management agency main responsibilities: a. make guideline and direction according to local government policy and national disaster management agency related to disaster countermeasure effort which consists of prevention, emergency response. rehabilitation, restructuration, and reconstruction in fair and equal manner
		Hyogo Framework of Actions (HFA) Economy and Social Board of United Nations in the Resolution No. 63/ 1999 promote to governments in all nations to formulate and implement disaster risk reduction (DRR)Action Plan to support and ensure sustainable development goals. As country which has disaster-prone areas, Indonesia has big concern to formulate such action plans documents.

CC DIMENSION	CC CRITERIA	QUOTATIONS
		HFA 2005-2015 suggests all nations worldwide to develop integrated DRR mechanism which is supported by organization and sufficient resource capacity. These three aspects are not yet being prioritized in Indonesia. Existing disaster countermeasure organization does not have sufficient authority and current mechanism is limited to emergency response mechanism
		(3) spatial function in Padang are formulated based on: c. disaster mitigation efforts
	related DRM measures	Authority of local government in operationalization of disaster countermeasure are: b. formulation of development plan which include disaster countermeasure policy aspects d. formulation of technology utilization which potentially become source of threats or disaster hazards in Padang e. formulation of prevention policy in natural resources exploitation and occupation
		Disaster countermeasure implementation in non-occurring condition consists of: a. disaster countermeasure planning b. disaster risk reduction c. prevention d. integration in development planning e. requirements for disaster risks analysis f. implementation and enforcement of spatial plans g. education and training h. requirements for technical standards and disaster countermeasure operationalization
		Disaster risk reduction activities in non-occurring condition consists of: a. Introduction and disaster risk monitoring b. disaster countermeasure participatory planning c. development of disaster awareness culture d. increasing commitment of all actors in disaster countermeasure e. Physical and non-physical implementation as well as disaster countermeasure regulation
		Prevention activities in non-occurring condition consists of: a. concrete identification and introduction towards hazard sources or threats b. control to sudden or gradual occupation and exploitation of natural resources which potentially become disaster source c. monitoring on sudden and gradual use of technology which potentially become disaster source d. spatial planning and environment preservation, and e. strengthening social endurance within society
		Spatial planning enforcement is implemented to reduce disaster risk which includes enforcement of regulations related spatial arrangement, safety standards, and sanction for offenders
		Disaster countermeasure implementation in potential disaster condition consists of: a. preparedness b. early warning c. disaster mitigation
		Disaster countermeasure implementation in post-disaster phase consists of: a. rehabilitation b. construction

CC DIMENSION	CC CRITERIA	QUOTATIONS
		Spatial plan strategy: a. separate city activity center and regional activity center to relatively safe areas from disaster threats and integrate it with development of surrounding regions. b. develop city service center in northern, southern and center of the city with regional and city service scale as city development driver which is based on disaster mitigation
		strategy for urban infrastructure development that is sufficient according to capacity and service coverage for society as well as considers emergency situation from natural disaster event
		constraints settlement development in disaster-prone areas (beaches, protected areas, water catchment areas)
		spatial strategy: rehabilitating public facilities that are damaged by natural disaster
		spatial strategy: control development in tsunami-prone areas
		(1) determination of disaster-prone areas as protected areas is aimed to minimize death toll and material loss due to natural disaster
		(3) landslide-prone areas are determined as protected area. Therefore, government has obligation to relocate settlement located in that areas
		d. each government building which will be constructed in tsunami-prone areas are required to have minimum height of 2 stories for evacuation shelter in roof top
		cultivation area development includes disaster evacuation area
	Improve DRM procedures	Local government in specific time period monitor disaster countermeasure planning documents periodically
		Early warning system service which becomes responsibility of local government consists of: a. build and integrate tsunami early warning system by: 1. develop/ improve early warning system periodically and continuously"
		this preparedness is implemented through: d. organization, socialization, training and rehearsal of emergency response mechanism f. accurate data compilation, information and updating of permanent disaster procedures
		Disaster countermeasure plans are periodically monitored
DM Operationalization Score = 4/3 = 1.33	**competency of local implementing agencies**	Local disaster countermeasure agency as mentioned in verse (1) should lead by an government officer which has minimum IIa title
		Local Government regulation No. 18/ 2008 ORGANIZATION ESTABLISHMENT AND WORK ARRANGEMENT OF LOCAL DISASTER MANAGEMENT IN PADANG
		Local disaster management agency has main responsibilities: e. perform disaster countermeasure operationalization in Padang
		A. Organization Permanent procedure of disaster countermeasure is implemented in Control Commando (KODAL). Organization structure of KODAL in Padang for disaster emergency response consists of:

CC DIMENSION	CC CRITERIA	QUOTATIONS
		1. KODAL Padang 2. KODAL emergency response 3. POSDAL neighborhood 4. POSDAL sub district B. KODAL PADANG KODAL Padang is the highest hierarchy of emergency countermeasure system organization in Padang. KODAL Padang is responsible for all operationalization of early warning system and emergency response in Padang
		Major Decree No. 58/ 2009 DESCRIPTION OF MAIN RESPONSIBILITIES AND FUNCTIONS OF LOCAL DISASTER MANAGEMENT AGENCY IN PADANG
		Organization structure of local disaster management agency consists of: 1. Head of Agency 2. Directive elements 3. Operationalization elements as follow: a. Head of operationalization b. Operational Secretariat: 1) general sub section 2) finance sub section 3) program formulation sub section c. prevention and preparedness section: 1) prevention section 2) preparedness section d. emergency and logistic sub section: 1) rescue, evacuation and service of disaster victims 2) identification, data collection, and recovery e. rehabilitation and reconstruction: 1) rehabilitation 2) reconstruction"
	guidelines for basic routines	Early warning is implemented to decide quick and appropriate actions in order to reduce direct disaster impact as well as to prepare further emergency steps
		Policy title: "Local Government Regulation about Implementation of Early Warning System in Padang"
		Major Decree No. 25/ 2011 PERMANENT PROCEDURE OF DISASTER COUNTERMEASURE IN PADANG
		Standard Operational Procedure (SOP) of early warning system and disaster countermeasure in Padang consists of 9 procedures: 1. self-rescue 2. activation receiver device and direction distribution 3. early warning receiver and directions legitimation 4. direction distribution 5. controlling command transition 6. subsequent early warning receiver 7. quick analysis and disaster status determination 8. disaster emergency activities 9. disaster emergency cessation
	Quick procedures activation	e. if PUSDALOBS-PB is still not able to contact the Major in 1 minute after analysis and decision making, therefore PUSDALOPS-PB can directly apply dissemination of early warning system information which is continued by permanent procedure of

CC DIMENSION	CC CRITERIA	QUOTATIONS
		emergency response.
		Decision of disaster emergency status is performed by KODAL Padang based on recommendation from TRC and BPBD quick analysis result."
		Condition with no communication is when first chain of KODAL commander cannot response to communication from local disaster management agency using three validated modes of communication, thus communication is continued to second chain (and so on to the sixth chain). This can only be applied for early warning receive level I procedure.
DM resources Score = 0	**Quick resource allocation**	Responsibility of local government in operationalization of disaster countermeasure are: d. allocation of disaster countermeasure stand-ready fund in local income budget e. allocation disaster countermeasure budget in the form of stand-ready fund
		Authority of local government in operationalization of disaster countermeasure are: f. controlling collection and distribution of fund and logistics
		In case of disaster status announcement, head of local disaster management agency is authorized to perform and/ or ask for resources mobilization as follow: a. society and volunteers b. search and rescue c. Military of Indonesia d. Police of Indonesia e. the Red Cross of Indonesia f. society protection g. social-religious organization h. international organization related to disaster countermeasure
		Local government allocate disaster countermeasure fund in proper way in local income and expenditure budget plan
		(1) in emergency situation, local disaster management agency utilize stand-ready fund (2) stand-ready fund is provided by local government in local disaster management agency budget
		Early warning system service which becomes responsibility of local government consists of: a. give suggestion of fund allocation for early warning system implementation for tsunami in local income and expenditure budget
		Development g. infrastructure preparedness for backup system to anticipate disaster events
		in emergency situation, local disaster management agency direct disaster fund resources utilization which are available in related sectors
	Qualification of actor capacity	*No related quotation found*
	Proper access to information	Society have rights as follow: c. to get written and/or unwritten information related to disaster countermeasure policies
		response scheme for early warning system consists of: a. information source 2. source of information which can be used by society is information that is announced by PUSDALOPS and/or

CC DIMENSION	CC CRITERIA	QUOTATIONS
		BMKG as well as electronic media which refer to PUSDALOPS and/ or BMKG b. time needed to receive information 1. PUSDALOPS PB and society will receive information from BMKG about earthquake which occurs approximately after the 5th minute in the form of earthquake information without any command
		Dissemination of early warning system information a. information types and early warning from PUSDALOPS PB to related organizations and society 1. earthquake information 2. evacuation or not b. PUSDALOPS PB members have to inform development of tsunami occurrence, end of tsunami probability, or end of tsunami occurrence to the Major, society, and all related organization c. in information distribution and/or direction for society, PUSDALOPS PB members and all related organization use standard format in one guideline book published by local disaster management agency
Overall coping capacity score of local DM institution in Padang = [1.33 + 0 + 1.33]/3 = 0.88		

APPENDIX 2:
Coding and Scoring from Primary Documents of Province DM Institution

AC DIMENSION	AC CRITERIA	QUOTATIONS
Variety of adaptation properties Score= -2/3 = -0.67	**Categorizing hazards**	*No related quotation found*
	scenario building for the uncertainties	*No related quotation found*
	Transboundary scope (multi-sector, multi-level, multi-discipline, multi-actor)	Membangun partisipasi dan kemitraan publik serta swasta;
		pelaksanaan kebijakan kerja sama dalam penanggulangan bencana dengan propinsi dan/atau Kabupaten/Kota lain;
		Lembaga internasional menjadi mitra masyarakat dan Pemerintah Daerah dalam penanggulangan bencana.
Learning Capacity Score= 0	**stimulate initiatives of local actors**	c. Penyelenggaraan pendidikan, penyuluhan dan pelatihan baik secara konvensional maupun modern.
		e. Berpartisipasi dalam pengambilan keputusan terhadap kegiatan penanggulangan bencana, khususnya yang berkaitan dengan diri dan komunitasnya;
		Berperan serta dalam perencanaan, pengoperasian, dan pemeliharaan program penyediaan bantuan pelayanan kesehatan termasuk dukungan psikososial;
		g. pendidikan dan pelatihan;
		Yang dimaksud dengan "Asas Kemandirian" dalam upaya Penanggulangan Bencana dan penanganan pengungsi dititikberatkan pada kegiatan yang didukung oleh swadaya masyarakat.
		i. Partisipasi dan peran serta lembaga serta organisasi kemasyarakatan, dunia usaha dan masyarakat;
		b. Mendapatkan pendidikan, pelatihan dan keterampilan dalam peneyelenggaraan penanggulangan bencana;
	Recognize and evaluate past experiences	Belajar dari pengalaman bencana gempa bumi dan tsunami 26 Desember 2004 lalu di Propinsi Daerah Istimewa Aceh, tanah longsor, angin puting beliung, banjir bandang serta akibat bencana gunung berapi yang pernah terjadi di daerah kita beberapa waktu yang lalu, maka perlu ditetapkan Peraturan Daerah tentang Penanggulangan Bencana.
	building indicators for assessment	*No related quotation found*
Room for autonomous change Score= -3/3 = -1	**incremental development phase**	*No related quotation found*
	allow changing assumption towards hazards pattern	*No related quotation found*
	authority delegation to local actors	Wewenang Pemerintah Daerah dalam penanggulangan bencana sebagaimana dimaksud dalam Pasal 6 dapat diselenggarakan oleh Pemerintah Kabupaten/Kota yang diatur lebih lanjut dengan Peraturan Daerah Kabupaten/Kota.
		Dalam melaksanakan tanggung jawab penanggulangan

AC DIMENSION	AC CRITERIA	QUOTATIONS
		bencana, Pemerintah Daerah, melimpahkan tugas pokok dan fungsinya kepada Badan Penanggulangan Bencana Daerah.
		Pemerintah Daerah dan Pemerintah Kabupaten/Kota menjadi penanggung jawab dalam penyelenggaraan penanggulangan bencana.
Overall adaptive capacity score of province DM institution in Padang = [(-0.67) + 0 + (-1)]/3 = -0.56		

CC DIMENSION	CC CRITERIA	QUOTATIONS
DM Acknowledgment Score = 2/3 = 0.67	**availability of DM approach(es)**	*No related quotation found*
	related DRM measures	Peringatan dini sebagaimana dimaksud dalam Pasal 37 huruf b dilakukan untuk pengambilan tindakan cepat dan tepat dalam rangka mengurangi risiko terkena bencana serta mempersiapkan tindakan tanggap darurat;
		Rekonstruksi dilakukan melalui kegiatan : e. Pembangunan kembali prasarana dan prasarana; f. Pembangunan kembali sarana sosial masyarakat ; g. Pembangkitan kembali kehidupan sosial budaya masyarakat; h. Penerapan rancang bangun yang tepat dan penggunaan peralatan yang lebih baik serta tahan bencana; i. Partisipasi dan peran serta lembaga serta organisasi kemasyarakatan, dunia usaha dan masyarakat; j. Peningkatan kondisi sosial, ekonomi dan budaya; k. Peningkatan fungsi pelayanan publik; dan l. Peningkatan pelayanan utama dalam masyarakat.
		Kegiatan mitigasi sebagaimana dimaksud pada ayat (1) dilakukan melalui: a. Pelaksanaan penataan ruang b. Pengaturan pembangunan, pembangunan infrastruktur, tata bangunan dan; c. Penyelenggaraan pendidikan, penyuluhan dan pelatihan baik secara konvensional maupun modern.
		Pencegahan sebagaimana dimaksud dalam Pasal 31 huruf c meliputi: a. identifikasi dan pengenalan terhadap sumber bahaya atau ancaman bencana; b. kontrol terhadap penguasaan dan pengelolaan sumber daya alam yang secara tiba-tiba dan/atau berangsur berpotensi menjadi sumber bahaya bencana; c. pemantauan penggunaan teknologi yang secara tiba-tiba dan/atau berangsur berpotensi menjadi sumber ancaman atau bahaya bencana; dan d. penataan ruang dan pengelolaan lingkungan hidup. e. penguatan ketahanan sosial masyarakat
		Kesiap-siagaan sebagaimana dimaksud pada ayat (1) dilakukan melalui: a. penyusunan dan ujicoba rencana penanggulangan kedaruratan bencana; b. pengorganisasian, pemasangan dan pengujian sistem peringatan dini; c. penyediaan dan penyiapan barang-barang pasokan pemenuhan kebutuhan dasar; d. pengorganisasian, penyuluhan, pelatihan dan gladi tentang mekanisme tanggap darurat; e. penyiapan lokasi evakuasi ; dan f. penyusunan data akurat, informasi, dan pemutakhiran prosedur-prosedur tetap tanggap darurat bencana.

CC DIMENSION	CC CRITERIA	QUOTATIONS
		g. penyediaan dan penyiapan bahan, barang dan peralatan untuk pemenuhan pemulihan prasarana dan sarana
		Rehabilitasi sebagaimana diamksud dalam Pasal 52 huruf a dilakukan melalui kegiatan: a. perbaiakna lingkungan daerah bencana; b. perbaikan prasarana dan sarana umum; c. pemberian bantuan perbaikan rumah masyarakat; d. pemulihan sosial psikologis; e. pelayanan kesehatan; f. rekonsiliasi dan resolusi konflik; g. pemulihan sosial ekonomi budaya h. pemulihan keamanan dan ketertiban; i. pemulihan fungsi pemerintahan; j. pemulihan fungsi pelayanan publik.
	Improve DRM procedures	pemutakhiran prosedur-prosedur tetap tanggap darurat bencana.
		Mengaktivasi Posko adalah serangkaian kegiatan untuk meningkatkan kemampuan personil, sarana dan prasarana Pusdalops Penanggulangan Bencana menjadi Posko dalam rangka efektifitas penanganan darurat bencana
DM Operationalization Score = 2/3 = 0.67	**competency of local implementing agencies**	Dalam penyelenggaraan penanggulangan bencana Pemerintah Daerah membentuk Badan Penanggulangan Bencana;
		Tim Reaksi Cepat BPBD disingkat TRC BPBD adalah suatuTim yang dibentuk oleh Kepala BPBD, terdiri dari instansi/lembaga teknis/non teknis terkait yang bertugas melaksanakan kegiatan kaji cepat bencana dan dampak bencana pada saat tanggap darurat meliputi penilaian kebutuhan (needs assesment), penilaian kerusakan dan kerugian (damage and loses assesment) serta memberikan dukungan pendampingan (membantu SATLAK PB/BPBD Kabupaten/Kota) dalam penanganan darurat bencana.
	guidelines for basic routines	PROSEDUR TETAP TIM REAKSI CEPAT PROVINSI SUMATERA BARAT
	Quick procedures activation	---
DM resources Score = 4/3 = 1.33	**Quick resource allocation**	f. alokasi tugas, kewenangan dan sumber daya yang tersedia
		Kepala Daerah mempunyai kewenangan untuk mengalokasikan dan mendistribusikan bantuan kepada Kbaupaten/Kota sesuai dengan ketentuan yang berlaku
		Dalam hal status keadaan darurat bencana ditetapkan Badan Penanggulangan Bencana Daerah mempunyai kemudahan akses yang meliputi: a. pengerahan sumber daya manusia; b. pengerahan peralatan; c. pengerahan logistik;

CC DIMENSION	CC CRITERIA	QUOTATIONS
	Qualification of actor capacity	Persyaratan Anggota TRC BPBD Provinsi Sumatera Barat 1. Kualifikasi Personil a. Sehat jasmani/rohani. b. Telah mengikuti pelatihan/workshop TRC. c. Berpengalaman di bidang kedaruratan bencana. 3. Bersedia ditugaskan ke lokasi bencana minimal 3 s/d 7 hari. 4. Setiap saat, selama masa penugasannya siap sedia dengan perlengkapan perorangannya di kantor/kendaraan atau di rumah yang dapat diambil dalam waktu relatif singkat/cepat.
	Proper access to information	Lembaga usaha berkewajiban menyampaikan laporan kepada pemerintah dan/atau badan yang diberi tugas melakukan penanggulangan bencana serta menginformasikan kepada publik secara transparan
		Mendapatkan informasi secara tertulis dan/atau lisan tentang kebijakan penanggulangan bencana
Overall adaptive capacity score of province DM institution in Padang = [0.67 + 0.67 + 1.33]/3 = 0.89		

APPENDIX 3:
Coding and Scoring from Primary Documents of National DM Institution

AC DIMENSION	AC CRITERIA	QUOTATIONS
Variety of adaptation properties Score= 0	Categorizing hazards score= 0	Bencana adalah peristiwa atau rangkaian peristiwa yang mengancam dan mengganggu kehidupan dan penghidupan masyarakat yang disebabkan, baik oleh faktor alam dan/atau faktor nonalam maupun faktor manusia sehingga mengakibatkan timbulnya korban jiwa manusia, kerusakan lingkungan, kerugian harta benda, dan dampak psikologis
		Multi Ancaman. Kegiatan pengurangan risiko bencana harus mempertimbangkan potensi risiko dari seluruh ancaman yang dihadapi warga masyarakat dan desa/kelurahan. Pemetaan risiko yang dilakukan bisa jadi akan mendapati adanya beberapa ancaman sekaligus di satu wilayah. Oleh karena itu, perencanaan aksi dan perencanaan pembangunan juga harus mempertimbangkan penanggulangan dari beberapa ancaman tersebut.
	scenario building for the uncertainties score = 0	---
	Network Governance score= 2	Yang dimaksud dengan "asas kebersamaan" adalah bahwa penanggulangan bencana pada dasarnya menjadi tugas dan tanggung jawab bersama Pemerintah dan masyarakat yang dilakukan secara gotong royong.
		(4) Kegiatan pencegahan sebagaimana dimaksud pada ayat (3) menjadi tanggung jawab Pemerintah, pemerintah daerah, dan masyarakat
		Diselenggarakan Secara Lintas Sektor. Keberhasilan kerja koordinasi lintas sektor akan menjamin adanya pengarusutamaan pengurangan risiko bencana dalam program sektoral sehingga mengefektifkan kerja-kerja pengurangan risiko bencana dalam mewujudkan Desa/Kelurahan Tangguh Bencana. Sinergi kerja lintas sektor ini juga akan dapat menghindari tumpang-tindih program/kegiatan yang dapat berakibat pada inefisiensi pendanaan.
		Kegiatan perbaikan lingkungan daerah bencana sebagaimana dimaksud dalam Pasal 56 ayat (1) huruf a dilaksanakan oleh instansi/lembaga terkait sesuai dengan fungsi dan tanggung jawab bidang tugas masing-masing bersama masyarakat
		(2) Pemenuhan kebutuhan dasar sebagaimana dimaksud pada ayat (1) dilakukan oleh Pemerintah, pemerintah daerah, masyarakat, lembaga usaha, lembaga internasional dan/atau lembaga asing nonpemerintah sesuai dengan standar minimum sebagaimana diatur dalam ketentuan peraturan perundang-undangan. (3) Kegiatan kesiapsiagaan sebagaimana dimaksud pada ayat (2) merupakan tanggung jawab Pemerintah, pemerintah daerah dan dilaksanakan bersama-sama masyarakat dan lembaga usaha.
		(3) Kegiatan kesiapsiagaan sebagaimana dimaksud pada ayat (2) merupakan tanggung jawab Pemerintah, pemerintah daerah dan dilaksanakan bersama-sama masyarakat dan lembaga usaha.
		p) Diselenggarakan Secara Lintas Sektor. Keberhasilan kerja koordinasi lintas sektor akan menjamin adanya pengarusutamaan pengurangan risiko bencana dalam

AC DIMENSION	AC CRITERIA	QUOTATIONS
		program sektoral sehingga mengefektifkan kerja-kerja pengurangan risiko bencana dalam mewujudkan Desa/Kelurahan Tangguh Bencana. Sinergi kerja lintas sektor ini juga akan dapat menghindari tumpang-tindih program/kegiatan yang dapat berakibat pada inefisiensi pendanaan.
		Prinsip-prinsip kemitraan yang digunakan meliputi persamaan (equality), keterbukaan (transparency), dan saling menguntungkan (mutual benefit)
		Kemitraan. Program akan mengutamakan kemitraan atau kerjasama antara individu, kelompok atau organisasi-organisasi
		Kelembagaan: pembentukan forum Penanggulangan Bencana Desa/Kelurahan yang berasal dari unsur pemerintah dan masyarakat, kelompok/tim relawan penanggulangan bencana di dusun, RW dan RT,
		Membangun sinergi program dengan seluruh pelaku (kementerian, lembaga negara, organisasi sosial, lembaga usaha, dan perguruan tinggi) untuk memberdayakan masyarakat desa/kelurahan
		agar pelaksanaan RPB dapat melibatkan seluruh pemangku kepentingan, harus ada payung hukum pelindung berupa Peraturan Desa atau perangkat lain yang setingkat di kelurahan
		Meningkatkan kerjasama antara para pemangku kepentingan dalam PRB, pihak pemerintah daerah, sektor swasta, perguruan tinggi, LSM, organisasi masyarakat dan kelompok-kelompok lainnya yang peduli
		Kemitraan dibangun di dalam masyarakat, maupun antara masyarakat dengan pihak lain. Dalam beberapa kasus bencana, sering kali pertolongan pertama datang dari masyarakat yang tinggal di kawasan-kawasan tetangga terdekat
		Masyarakat dapat membangun kerjasama yang saling menguntungkan dengan lembaga swadaya masyarakat, lembaga usaha, maupun lembaga-lembaga lainnya dari luar komunitas untuk bersama-sama mengurangi risiko bencana.
Learning Capacity Score= 1.2/3 = 0.4	**stimulate initiatives of local actors score= 1.2**	(2) Penataan daerah rawan bencana sebagaimana dimaksud pada ayat (1) dilakukan melalui upaya: a. melakukan kampanye peduli bencana; b. mendorong tumbuhnya rasa peduli dan setia kawan pada lembaga, organisasi kemasyarakatan, dan dunia usaha; dan c. mendorong partisipasi dalam bidang pendanaan dan kegiatan persiapan menghadapi bencana.
		(2) Upaya menata kembali kehidupan sosial budaya masyarakat dilakukan dengan cara: b. mempersiapkan masyarakat melalui kegiatan kampanye sadar bencana dan peduli bencana; d. mendorong partisipasi masyarakat dalam kegiatan pengurangan risiko bencana.
		(1) Pendidikan dan pelatihan sebagaimana dimaksud dalam Pasal 5 ayat (1) huruf g ditujukan untuk meningkatkan kesadaran, kepedulian, kemampuan, dan kesiapsiagaan masyarakat dalam menghadapi bencana.
		1) Partisipasi dan peran serta lembaga dan organisasi kemasyarakatan, dunia usaha dan masyarakat sebagaimana dimaksud dalam Pasal 75 ayat (1) huruf e bertujuan untuk meningkatkan partisipasi dalam rangka membantu penataan daerah rawan bencana ke arah lebih baik dan rasa kepedulian

AC DIMENSION	AC CRITERIA	QUOTATIONS
		daerah rawan bencana.
		(2) Kegiatan pembangunan kembali sarana sosial masyarakat sebagaimana dimaksud pada ayat (1) harus berdasarkan perencanaan teknis dengan memperhatikan masukan dari instansi/lembaga terkait dan aspirasi masyarakat daerah bencana.
		Tujuan partisipasi dan peran serta lembaga dan organisasi kemasyarakatan, dunia usaha dan masyarakat dalam ketentuan ini dimaksudkan untuk meningkatkan peran serta lembaga dan organisasi kemasyarakatan, dunia usaha dan masyarakat dalam segala aspek kehidupan bermasyarakat pada wilayah pascabencana.
		(2) Perbaikan prasarana dan sarana umum sebagaimana dimaksud pada ayat (1) harus didasarkan pada perencanaan teknis, dengan memperhatikan masukan mengenai jenis kegiatan dari instansi/lembaga terkait dan aspirasi kebutuhan masyarakat.
		Penyelenggaraan penanggulangan bencana dilaksanakan dengan memperhatikan hak masyarakat yang antara lain mendapatkan bantuan pemenuhan kebutuhan dasar, mendapatkan perlindungan sosial, mendapatkan pendidikan dan keterampilan dalam penyelenggaraan penanggulangan bencana, berpartisipasi dalam pengambilan keputusan.
		4) Pembangunan kembali prasarana dan sarana sebagaimana dimaksud pada ayat (1) harus berdasarkan perencanaan teknis dengan memperhatikan masukan dari instansi/lembaga terkait, pemerintah daerah setempat dan aspirasi masyarakat daerah bencana.
		Yang dimaksud dengan "upaya nonfisik" adalah berupa kegiatan pelatihan dan penyadaran masyarakat.
		(2) Pemerintah dan pemerintah daerah mendorong partisipasi masyarakat dalam penyediaan dana yang bersumber dari masyarakat.
		Selain itu, setiap warga juga berhak dan berkesempatan untuk melakukan pengawasan terhadap jalannya program. Singkatnya, program akan membuka diri dan menghormati prakarsa-prakarsa yang datang dari warga.
		3. Terwujudnya penggunaan pengetahuan, inovasi dan pendidikan untuk membangun ketahanan dan budaya aman dari bencana di semua tingkat; dengan indikator : a. Tersedianya informasi yang relevan mengenai bencana dan dapat diakses di semua tingkat oleh seluruh pemangku kepentingan (melalui jejaring, pengembangan system untuk berbagi informasi, dst) b. Kurikulum sekolah, materi pendidikan dan pelatihan yang relevan mencakup konsep-konsep dan praktik-praktik mengenai pengurangan risiko bencana dan pemulihan c. Tersedianya metode riset untuk kajian risiko multi bencana serta analisis manfaat-biaya (cost benefit analysist) yang selalu dikembangkan berdasarkan kualitas hasil riset d. Diterapkannya strategi untuk membangun kesadaran seluruh komunitas dalam melaksanakan praktik budaya tahan bencana yang mampu menjangkau masyarakat secara luas baik di perkotaan maupun pedesaan.
		Tekanan khusus pada penggunaan dan pemanfaatan sumber daya mandiri setempat dengan fasilitasi eksternal yang seminimum mungkin
		Upaya PRB yang menempatkan warga masyarakat yang tinggal di kawasan rawan bencana sebagai pelaku utama, sebagai subjek yang berpartisipasi dan bukan objek, akan lebih berkelanjutan dan berdaya guna

AC DIMENSION	AC CRITERIA	QUOTATIONS
		Inklusif. Program pengembangan Desa/Kelurahan Tangguh Bencana menggunakan prinsip pelibatan semua pihak, dengan mengakomodasi sumber-sumber daya dari berbagai kelompok di dalam maupun di luar desa sebagai bagian dari jaringan sosial komunitas desa yang berdasarkan solidaritas dan kerelawanan.
		Desa/Kelurahan Tangguh Bencana adalah desa/kelurahan yang memiliki kemampuan mandiri untuk beradaptasi dan menghadapi potensi ancaman bencana, serta memulihkan diri dengan segera dari dampak-dampak bencana yang merugikan.
		Pemberdayaan masyarakat adalah suatu proses di mana masyarakat atau mereka yang kurang beruntung dalam sumber daya pembangunan didorong untuk mandiri dan mengembangkan kehidupan sendiri.
		Masyarakat Menjadi Pelaku Utama. Dalam proses mewujudkan Desa/Kelurahan Tangguh Bencana, masyarakat harus menjadi pelaku utama,
		Pelibatan seluruh lapisan masyarakat, terutama mereka yang paling rentan secara fisik, ekonomi, lingkungan, sosial dan keyakinan, termasuk perhatian khusus pada upaya pengarusutamaan gender ke dalam program
		Peningkatan pengetahuan dan kesadaran masyarakat akan potensi ancaman di desa/kelurahan mereka dan akan kerentanan warga
		Otonomi dan Desentralisasi Pemerintahan. Dalam konteks desentralisasi pembangunan, desa ditempatkan sebagai entitas yang otonom/mandiri. Prinsip otonomi adalah masyarakat memiliki hak dan kewenangan mengatur diri secara mandiri dan bertanggung jawab, tanpa intervensi dari luar, dalam pengelolaan pembangunan
		Rencana Penanggulangan Bencana harus disusun bersama masyarakat, karena warga masyarakat di kawasan rawan bencana merupakan pihak yang paling terpapar ancaman dan paling mengenal wilayahnya
		Dilakukan Secara Partisipatoris. Program Desa/Kelurahan Tangguh Bencana mendorong pengakuan atas hak dan ruang bagi setiap warga untuk menyampaikan suaranya dalam proses program. Warga masyarakat juga akan diberi kesempatan untuk mengakses atau mempengaruhi pembuatan kebijakan dan strategi program, termasuk akses terhadap layanan-layanan yang disediakan melalui program. Selain itu, setiap warga juga berhak dan berkesempatan untuk melakukan pengawasan terhadap jalannya program. Singkatnya, program akan membuka diri dan dan menghormati prakarsa-prakarsa yang datang dari warga
		2) Pendidikan, pelatihan dan peningkatan keterampilan dalam penyelenggaraan penanggulangan bencana;
		Peningkatan kapasitas dalam isu PRB akan meliputi pelatihan-pelatihan dalam Pemetaan Ancaman, HVCA atau Penilaian Ancaman, Kerantanan dan Kapasitas PMI, metode-metode PRA (Participatory Rural Appraisal) atau Penilaian Pedesaan Partisipatif, dan metode-metode serupa lainnya yang dibutuhkan
		di ujung program, yaitu di tingkat masyarakat, masyarakat sendirilah yang harus berperan aktif sebagai inisiator, perencana dan pelaksananya. Program ini harus bersifat "dari", "oleh" dan "untuk" masyarakat.

AC DIMENSION	AC CRITERIA	QUOTATIONS
	Recognize and evaluate past experiences score= -1	**Pemantauan penyelenggaraan penanggulangan bencana** sebagaimana dimaksud dalam Pasal 91, dilakukan oleh unsur pengarah beserta unsur pelaksana BNPB dan/atau BPBD dan dapat melibatkan lembaga perencanaan pembangunan nasional dan daerah, sebagai bahan evaluasi menyeluruh dalam penyelenggaraan Penanggulangan bencana.
		Evaluasi dapat dilakukan beberapa kali dalam masa implementasi program, setidaknya setiap tahun sekali. Pada akhir program dilakukan evaluasi akhir untuk mencari hikmah pembelajaran (lessons learned) dari pelaksanaan program.
	building indicators for assessment score= 1	- Desa/Kelurahan Tangguh Bencana Utama (skor 51-60) - Desa/Kelurahan Tangguh Bencana Madya (skor 36-50) - Desa/Kelurahan Tangguh Bencana Pratama (skor 20-35)
		Aspek dan Indikator Desa/Kelurahan Tangguh Bencana
		Ada beberapa perangkat yang dapat digunakan untuk melakukan pengkajian risiko, seperti misalkan HVCA (Hazard, Vulnerability and Capacity Assessment), yang dikembangkan oleh Palang Merah Indonesia
Room for autonomous change Score= 1.7/3 = 0.56	**allow changing assumption towards hazards pattern score= -0,5**	c. penyesuaian kehidupan sosial budaya masyarakat dengan lingkungan rawan bencana; dan
		Salah satu nilai strategis yang dapat dicapai dengan RPB dalam bentuk Perdes adalah integrasi isu kebencanaan ke dalam RPJM Desa.
		mendorong pemaduan PRB ke dalam Rencana Pembangunan Desa
		Pemaduan upaya-upaya pengurangan risiko bencana ke dalam pembangunan demi keberlanjutan
	incremental development phase score= 1.2	Yang dimaksud dengan "rencana kontinjensi" adalah suatu proses perencanaan ke depan terhadap keadaan yang tidak menentu untuk mencegah, atau menanggulangi secara lebih baik dalam situasi darurat atau kritis dengan menyepakati skenario dan tujuan, menetapkan tindakan teknis dan menejerial, serta tanggapan dan pengerahan potensi yang telah disetujui bersama.
		(3) Rencana penanggulangan kedaruratan bencana dapat dilengkapi dengan penyusunan rencana kontinjensi.
		Rencana Kontinjensi Desa merupakan dokumen perencanaan tingkat desa yang didasarkan pada keadaan darurat yang diperkirakan akan segera terjadi atau dapat terjadi. Rencana kontijensi mungkin tidak diaktifkan jika keadaan yang diperkirakan tidak terjadi. Rencana ini disusun untuk mengurangi korban dan kerugian apabila keadaan darurat yang dimaksudkan terjadi.
		Kepala Bidang Operasi dapat melakukan koreksi dan penyesuaian terhadap pelaksanaan Rencana Operasi sesuai dengan perkembangan yang terjadi di lapanga
		Perencanaan: penyusunan rencana Penanggulangan Bencana Desa; Rencana Kontinjensi bila menghadapi ancaman tertentu; dan Rencana Aksi Pengurangan Risiko Bencana Komunitas (pengurangan risiko bencana menjadi bagian terpadu dari pembangunan)
		Rencana Kontinjensi Desa/Kelurahan
		Tersedianya rencana kontinjensi bencana yang berpotensi terjadi yang siap di semua jenjang pemerintahan
		Mengaktifkan rencana kontinjensi yang terkait yang

AC DIMENSION	AC CRITERIA	QUOTATIONS
		disesuaikan dengan kondisi bencana yang terjadi.
		Rencana Kontinjensi (Renkon) merupakan suatu proses identifikasi dan penyusunan rencana yang didasarkan pada keadaan kontinjensi atau yang belum tentu tersebut. Suatu rencana kontinjensi mungkin tidak selalu pernah diaktifkan, jika keadaan yang diperkirakan tidak terjadi.
		Rencana kontijensi Bencana desa ini hanya digunakan untuk satu jenis bencana saja, dan disahkan dengan Peraturan Kepala Desa atau Keputusan Lurah, yang didasarkan kepada sistem legalisasi yang belaku di pemerintahan desa/ kelurahan setempat. Renkon dilakukan segera setelah ada tanda-tanda awal (kemungkinan) akan terjadi bencana.
	authority delegation to local actors score= 1	Keanggotaan unsur pengarah sebagaimana dimaksud pada ayat (1) terdiri atas: a. pejabat pemerintah daerah terkait; dan b. anggota masyarakat profesional dan ahli.
		Penggunaan peralatan dan analisis tentang informasi bencana sepenuhnya wewenang personil Pusdalops PB
		forum PRB Desa/Kelurahan perlu diberi kewenangan yang cukup dan status hukum yang pasti, sehingga dapat menjalin kerjasama dan hubungan kelembagaan yang baik dengan pemerintahan desa/kelurahan dan pemangku kepentingan lainnya
Overall adaptive capacity score of National DM institution in Padang = [0.6 + 0.4 + 0.56]/3 = 0.52		

CC DIMENSION	CC CRITERIA	QUOTATIONS
DM Acknowledgment Score=[0.5 + 0.75 + 2]/3 = 1.08	**availability of DM approach(es) score= 0.5**	Penyelenggaraan penanggulangan bencana dilaksanakan berdasarkan 4 (empat) aspek meliputi: a. sosial, ekonomi, dan budaya masyarakat; b. kelestarian lingkungan hidup; c. kemanfaatan dan efektivitas; dan d. lingkup luas wilayah.
		(1) Pemulihan sosial psikologis sebagaimana dimaksud dalam Pasal 56 ayat (1) huruf d ditujukan untuk membantu masyarakat yang terkena dampak bencana, memulihkan kembali kehidupan sosial dan kondisi psikologis pada keadaan normal seperti kondisi sebelum bencana.
		Penanggulangan Bencana, sebagaimana tercantum dalam Pasal 4, bertujuan untuk antara lain : 1. memberikan perlindungan kepada masyarakat dari ancaman bencana; 2. menjamin terselenggaranya penanggulangan bencana secara terencana, terpadu, terkoordinasi, dan menyeluruh
		Setiap orang berhak: a. mendapatkan perlindungan sosial dan rasa aman, khususnya bagi kelompok masyarakat rentan bencana;
		Pengurangan risiko bencana sebagaimana dimaksud dalam Pasal 5 huruf b merupakan kegiatan untuk mengurangi ancaman dan kerentanan serta meningkatkan kemampuan masyarakat dalam menghadapi bencana.
		Penyelenggaraan penanggulangan bencana bertujuan untuk menjamin terselenggaranya pelaksanaan penanggulangan bencana secara terencana, terpadu, terkoordinasi, dan menyeluruh dalam rangka memberikan perlindungan kepada masyarakat dari

CC DIMENSION	CC CRITERIA	QUOTATIONS
		ancaman, risiko, dan dampak bencana.
		Peraturan Kepala BNPB nomor 3 tahun 2008 tentang Pedoman Pembentukan Badan Penanggulangan Bencana Daerah (BAB II), menetapkan bahwa pemerintah daerah bertanggung jawab untuk, antara lain, melindungi masyarakat dari ancaman dan dampak bencana
		Masyarakat yang sudah mencapai tingkat ketangguhan terhadap bencana akan mampu mempertahankan struktur dan fungsi mereka sampai tingkat tertentu bila terkena bencana.
		Program Desa/Kelurahan Tangguh Bencana akan mengacu juga pada kerangka masyarakat tangguh internasional yang dikembangkan berdasarkan Kerangka Aksi Hyogo, yakni mengandung aspek tata kelola; pengkajian risiko; peningkatan pengetahuan dan pendidikan kebencanaan; manajemen risiko dan pengurangan kerentanan; dan aspek kesiapsiagaan serta tanggap bencana.
		Berbasis Pengurangan Risiko Bencana. Pengembangan Desa/Kelurahan Tangguh Bencana harus berdasarkan analisis risiko dan upaya sistematis untuk mengurangi risiko ini serta meningkatkan kapasitas masyarakat dalam menghadapi ancaman bencana. Kebijakan pengurangan risiko bencana biasanya juga menjaga agar kegiatan pembangunan tidak meningkatkan kerentanan masyarakat.
		6. Pengurangan kerentanan masyarakat desa/kelurahan untuk mengurangi risiko bencana
		Upaya pengurangan risiko bencana berupa : 1. Memperkecil ancaman kawasan; 2. Mengurangi kerentanan kawasan yang terancam; 3. Meningkatkan kapasitas kawasan yang terancam
	related DRM measures score= 0.75	Kesiapsiagaan adalah serangkaian kegiatan yang dilakukan untuk mengantisipasi bencana melalui pengorganisasian serta melalui langkah yang tepat guna dan berdaya guna
		Tanggap darurat bencana adalah serangkaian kegiatan yang dilakukan dengan segera pada saat kejadian bencana untuk menangani dampak buruk yang ditimbulkan, yang meliputi kegiatan penyelamatan dan evakuasi korban, harta benda, pemenuhan kebutuhan dasar, perlindungan, pengurusan pengungsi serta pemulihan prasarana dan sarana.
		Penyelenggaraan penanggulangan bencana adalah serangkaian upaya yang meliputi penetapan kebijakan pembangunan yang berisiko timbulnya bencana, kegiatan pencegahan bencana, tanggap darurat, dan rehabilitasi serta rekonstruksi.
		Mitigasi adalah serangkaian upaya untuk mengurangi risiko bencana, baik melalui pembangunan fisik maupun penyadaran dan peningkatan kemampuan menghadapi ancaman bencana.
		Penyelenggaraan penanggulangan bencana dalam situasi terdapat potensi terjadi bencana sebagaimana dimaksud dalam Pasal 4 huruf b meliputi: a. kesiapsiagaan;

CC DIMENSION	CC CRITERIA	QUOTATIONS
		b. peringatan dini; dan c. mitigasi bencana.
		Peringatan dini adalah serangkaian kegiatan pemberian peringatan sesegera mungkin kepada masyarakat tentang kemungkinan terjadinya bencana pada suatu tempat oleh lembaga yang berwenang.
		Pencegahan, mitigasi, kesiapsiagaan, penanganan darurat, rehabilitasi dan rekonstruksi.
		Penyelenggaraan Penanggulangan Bencana: kegiatan-kegiatan mitigasi fisik struktural dan non-fisik; sistem peringatan dini; kesiapsiagaan untuk tangggap darurat, dan segala upaya pengurangan risiko melalui intervensi pembangunan dan program pemulihan, baik yang bersifat struktural-fisik maupun non-struktural
	Improve DRM procedures score= 2	Pelaksanaan Rencana Operasi harus dimonitor dan dievaluasi pada setiap tahapan pengembangan dan implementasinya
		Rencana operasi harus dipersiapkan dan didistribusikan sebelum operasi dimulai, dibuat untuk setiap periode operasi, serta dimutakhirkan setiap hari
		latihan reguler diadakan untuk menguji dan mengembangkanprogram-program tanggap darurat bencana
DM Operationalization Score=[2 + 1+ 0]/3 = 1	**competency of local implementing agencies score= 2**	Pusat Pengendalian Operasi Penanggulangan Bencana yang selanjutnya disingkat Pusdalops PB adalah unsur pelaksana di BNPB/ BPBD yang bertugas menyelenggarakan sistem informasi dan komunikasi penanggulangan bencana
		PEDOMAN PUSAT PENGENDALIAN OPERASI PENANGGULANGAN BENCANA (PUSDALOPS-PB)
		27. Tim Reaksi Cepat atau TRC adalah suatu tim yang dibentuk yang terdiri dari berbagai instansi/lembaga teknis maupun non teknis yang bertugas melaksanakan kegiatan kaji cepat bencana, dampak bencana pada saat tanggap darurat
		Pedoman Pusat Pengendalian Operasi Penanggulangan Bencana (Pusdalops-PB) merupakan panduan kerja atau operasional bagi Badan Nasional Penanggulangan Bencana, Badan Penanggulangan Bencana Daerah, Instansi/Lembaga dan pemangku kepentingan penanggulangan bencana agar upaya penyelenggaraan penanggulangan bencana di seluruh Indonesia dapat dilakukan secara efisien dan efektif
		Tim Siaga Bencana Masyarakat. Tim ini akan menjadi kelompok masyarakat yang terlibat aktif alam kegiatan-kegiatan tanggap darurat dan pemulihan pasca bencana
	guidelines for basic routines score= 1	Penyusunan pedoman ini dimaksudkan untuk menjadi panduan kerja bagi personil yang terlibat di dalam Pusdalops PB. Pedoman ini juga diharapkan dapat memperjelas sistematika kegiatan penanggulangan bencana di wilayah, sehingga akan lebih mempermudah koordinasi antar instansi terkait dalam pelaksanaan kegiatan penanggulangan bencana.
		prosedur tetap Posko Tanggap Darurat (Perka BNPB Nomor 14 Tahun 2010).
		Pedoman Komando Tanggap Darurat (Perka BNPB

CC DIMENSION	CC CRITERIA	QUOTATIONS
		Nomor 10 Tahun 2008 dan Perka BNPB Nomor 14 Tahun 2010).
		Tujuan penyusunan Pedoman Kerja Pusdalops PB ini adalah sebagai berikut: a. Tersedianya panduan struktur organisasi dan tata kerja di dalam Pusdalops PB. b. Tersedianya panduan bagi personil dalam kegiatan rutin harian, maupun pada saat tanggap darurat. c. Tersedianya panduan dalam pengumpulan data, pengolahan, pelaporan sampai dengan penyusunan basis data. d. Tersedianya panduan dalam penentuan dan pemilihan lokasi untuk gedung Pusdalops PB.
		PEDOMAN KOMANDO TANGGAP DARURAT BENCANA
		PEDOMAN PENYUSUNAN RENCANA OPERASI DARURAT BENCANA
		PEDOMAN UMUM DESA/KELURAHAN TANGGUH BENCANA
		PEDOMAN UMUM PENGKAJIAN RISIKO BENCANA
		PROSEDUR PENYUSUNAN RENCANA OPERASI DARURAT BENCANA
		PETUNJUK PENGISIAN FORMULIR INFORMASI BENCANA
	Quick procedures activation Score= 0	Pada saat terjadi bencana di suatu tempat, Pusdalops PB diaktivasi menjadi Posko TD. Namun, karena perbedaan daerah operasi Pusdalops PB, maka aktivasi Posko ini dilakukan dengan mekanisme sebagai berikut :
		27. Tim Reaksi Cepat atau TRC adalah suatu tim yang dibentuk yang terdiri dari berbagai instansi/lembaga teknis maupun non teknis yang bertugas melaksanakan kegiatan kaji cepat bencana, dampak bencana pada saat tanggap darurat.
		a. Mendukung pengambilan keputusan secara cepat, tepat dan terkoordinasi.
		Apabila tidak ada komando lanjutan dari Kepala BNPB/BPBD dan terjadi krisis karena bencana, maka Manajer Pusdalops PB melakukan aktivasi Pusdalops PB menjadi Posko TD dengan mengacu pada Perka BNPB Nomor 14 Tahun 2010.
DM resources Score=[0.25 + 1.3 + 2]/3 = 1.2	**Quick resource allocation Score= 0.25**	Manajer Pusdalops PB melakukan perkiraan kebutuhan personil, dana, bahan dan peralatan logistik. Mendukung penyusunan rencana operasi tanggap darurat, melakukan koordinasi dengan pihak-pihak terkait.
		Mobilisasi Sumber Daya Lokal. Prakarsa pengurangan risiko bencana juga merupakan upaya pengerahan segenap aset, baik modal material maupun modal sosial, termasuk kearifan lokal masyarakat sebagai modal utama.
		PERMINTAAN DAN PENGERAHAN SUMBERDAYA KOMANDO TANGGAP DARURAT BENCANA TINGKAT KABUPATEN/KOTA
		Kepala Bidang Operasi menetapkan alokasi bantuan sumberdaya kepada masing-masing BPBD/Satkorlak PB/Satlak PB atau tim/kelompok untuk menjalankan tugas sesuai dengan kebutuhannya
		Pola Pengerahan Sumberdaya di Tingkat Kabupaten/Kota
		Rencana Penanggulangan Bencana Desa/Kelurahan (RPB Des/Kel) merupakan rencana strategis untuk mobilisasi

CC DIMENSION	CC CRITERIA	QUOTATIONS
		sumber daya berbagai pemangku kepentingan, pemerintah maupun non-pemerintah, dalam lingkup desa/kelurahan
		Pendistribusian logistik kepada masyarakat dilaksanakan oleh Komando Tanggap Darurat Bencana sesuai dengan dinamika yang terjadi, terutama untuk pemenuhan kebutuhan dasar hidup meliputi pangan, sandang, air bersih, sanitasi, hunian sementara, pelayanan kesehatan dan lain-lain.
		Pelaksanaan pengerahan sumber daya dari asal sampai dengan lokasi bencana dilaksanakan dibawah kendali Kepala BPBD Kabupaten/Kota yang bersangkutan.
	Qualification of actor capacity Score= 1.3	Manajer Pusdalops adalah personil yang diberi kewenangan untuk memantau, mengawasi, mengevaluasi dan merencanakan proses kerja di dalam Pusdalops PB. Personil ini juga menyampaikan laporan ke Kepala Badan sampai dengan melakukan aktivasi Pusdalops PB menjadi Posko TD manakala terjadi bencana
		Operator adalah personil yang berkemampuan dalam hal berkomunikasi, pengolahan, pemantauan dan melakukan analisa dan penyajian data untuk mendukung kegiatan Pusdalops PB baik dalam kegiatan rutin harian maupun pada kejadian bencana.
		7. Kapasitas merupakan aset, sumber daya, kekuatan dan keterampilan yang dimiliki masyarakat / lembaga yang memungkinkan masyarakat untuk mempertahankan dan mempersiapkan diri, mencegah, menanggulangi, meredam serta dengan cepat memulihkan diri dari akibat bencana
		5. Manajer Pusdalops PB melakukan perkiraan kebutuhan personil, dana, bahan dan peralatan logistik. Mendukung penyusunan rencana operasi tanggap darurat, melakukan koordinasi dengan pihak-pihak terkait.
		27. Tim Reaksi Cepat atau TRC adalah suatu tim yang dibentuk yang terdiri dari berbagai instansi/lembaga teknis maupun non teknis yang bertugas melaksanakan kegiatan kaji cepat bencana, dampak bencana pada saat tanggap darurat
		Personil Komando, adalah semua sumberdaya manusia yang bertugas dalam organisasi Komando Tanggap Darurat Bencana dengan kualifikasi dan kompetensi yang diperlukan untuk penugasan penanganan darurat bencana.
		Penilaian kapasitas mengidentifikasi kekuatan dan sumber daya yang ada pada setiap individu, rumah tangga, dan masyarakat untuk mengatasi, bertahan, mencegah, menyiapkan, mengurangi risiko, atau segera pulih dari bencana. Kegiatan ini akan mengidentifikasi status kemampuan komunitas di desa/kelurahan pada setiap sektor (sosial, ekonomi, keuangan, fisik dan lingkungan) yang dapat dioptimalkan dan dimobilisasikan untuk mengurangi kerentanan dan risiko bencana.
	Proper access to information score= 2	3. Manajer Pusdalops PB segera menelusuri penyebab kegagalan komunikasi dengan bantuan dari berbagai pihak yang memiliki akses, misalnya ke Koramil, Polsek.
		b. Mudah diakses oleh semua pihak termasuk penyedia jaringan komunikasi (telepon/fax/internet) dan pihak lain yang terlibat/berkepentingan. Penyampaian laporan

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		kepada publik dilakukan melalui media massa yang mudah diakses oleh masyarakat. k. Tersedianya sarana media informasi publik.
		d. Mudah diakses oleh penyedia jaringan komunikasi (telepon/fax, internet).
		b) Membentuk jaringan informasi dan komunikasi serta menyebarkan informasi tentang bencana tersebut ke media masa dan masyarakat luas
		Hubungan Masyarakat bertugas dan bertanggung jawab untuk: 1) Menghimpun data dan informasi penanganan bencana yang terjadi. 2) Membentuk jaringan informasi dan komunikasi serta menyebarkan informasi tentang bencana tersebut ke media massa dan masyarakat luas.
		a. Tersedianya informasi yang relevan mengenai bencana dan dapat diakses di semua tingkat oleh seluruh pemangku kepentingan (melalui jejaring, pengembangan system untuk berbagi informasi, dst)
		e. Menyebarluaskan informasi mengenai bencana dan pananganan bencana kepada media masa dan masyarakat luas.
Overall adaptive capacity score of National DM institution in Padang = [1.08 + 1 + 0.2]/3 = 1.09		