

Chapter I

Introduction

1.1 Background of Research

Floods are known as one of the disasters that usually occur every year when the rainy season arrives with excessive rain capacity, and where flash floods that occurred recently after cyclone Seroja in Asia Pacific in 2021 including Southeast Asia and Oceania e.g., Timor Indonesia had a massive impact on the safety of lives, damage to infrastructure, and changes in policy-planning and mitigation, and recovery strategies related to local resilience assets of the community that is reflected by its coping mechanisms e.g., the leadership role of indigenous/customary leaders in Timor and the village apparatus. A flash flood is a short and sudden local flood with great volume. It has a limited duration which follows within few (usually less than six) hours of heavy or excessive rainfall, rapid snowmelt caused by sudden increases in temperature or rain on snow, or after a sudden release of water from a dam or levee failure, or the break-up of an ice jam (APFM, 2012). Flash flood is the result of rapid rise of water along a stream or low-lying urban area (NASA, 2008). Flash flooding that occurred in the downstream area of Malaka Region is the lowest position of Benain-Noelmina rivers and Timor Ocean, Indonesia. Thus, floods have significance to the speed at which flood disaster occurs in a short period of time. Floods occurred between 5 hours and 8 hours of a significant rain event and is caused by excessive raining and intensive storms in a short amount of time and is also caused by man-made impact, e.g., deforestation (land-clearing, domestic settlement from the woods material, and legal mining C) was conducted by the local people of Timor, and the former refuge people/migrants of East Timor during the bitterness time of the civic war's referendum between Indonesia and East Timor in the late of 1990th (1999) whose some of them were living in the forests and the upstream area of North-Central Timor Regency and in the middle stream area of South-Central Timor Regency.

Generally, Indonesia is a flood-prone country. Based on disaster events in 2011, floods have ranked second as the disaster that causes

Flood Resilience Perceptions of Community-Based Participatory Research

the most casualties, damage to houses, and damage to public facilities. About 30 percent of the 500 rivers in Indonesia cross densely populated areas (Bakornas, 2007, in Damayanti, 2011). In addition, Belu Regency in East Nusa Tenggara Province also ranks highest for flood frequency. This can be seen in Tables 1-1 and 1-2 and the Figure 1-1 which show the number of disasters that occurred in Indonesia in 2011.

Table 1-1. Disaster in Indonesia in 2011.

| Type of Disaster Events | Number of Disaster Events | Victims/ Affected by the Disaster Events | | | House Damage | | | Damage to Public Facilities | | |
|-------------------------|---------------------------|--|----------------------------|------------------|--------------------|-----------------|-----------|-----------------------------|------------------|----------------------|
| | | Death and Disappearance | Suffering and Displacement | Severely damaged | Moderately damaged | Lightly damaged | Submerged | Health facilities | Means of worship | Education facilities |
| Tornado | 278 | 21 | 8,903 | 2,207 | 958 | 10,299 | 151 | 3 | 42 | 77 |
| Flood | 323 | 34 | 168,869 | 1,884 | 124 | 8,802 | 118,573 | 18 | 72 | 150 |
| Tidal flood | 71 | 122 | 80,145 | 2,745 | 1,442 | 7,525 | 30,972 | 25 | 107 | 95 |
| Flood and Landslide | 23 | 16 | 9,053 | 2,879 | 267 | 4,478 | 1,698 | 1 | 1 | 15 |
| Tidal wave/ Abrasion | 15 | 36 | 3,788 | 157 | 86 | 122 | 574 | - | 1 | - |
| Earthquake | 10 | 5 | 4,000 | 2,150 | 358 | 4,741 | - | 55 | 206 | 163 |
| House/ building fires | 346 | 14 | 8,763 | 2,155 | 37 | 93 | - | 10 | 8 | 8 |
| Forest and land fires | 21 | - | - | 5 | - | - | - | - | - | - |
| Industrial accidents | 1 | 10 | - | 9 | - | - | - | - | - | - |
| Transport accidents | 20 | 497 | - | 2 | - | - | - | - | - | - |
| Drought | 221 | - | - | - | - | - | - | - | - | - |
| Conflicts/ Social riots | 1 | 7 | - | - | - | - | - | - | - | - |
| Volcanic eruption | 4 | - | 9,699 | 1 | - | - | - | - | 1 | - |
| Landslide | 210 | 177 | 837 | 724 | 28 | 599 | 1,630 | - | 6 | 5 |
| Tsunami | 1 | 1 | 67 | 17 | - | 17 | - | 2 | 1 | - |
| Total | 1,545 | 940 | 294,124 | 14,935 | 3,300 | 36,676 | 153,598 | 114 | 445 | 513 |

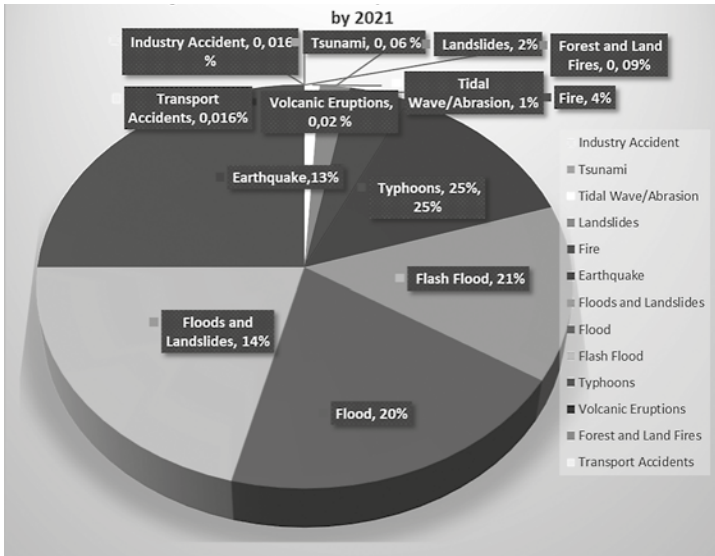
(Source: BNPB, 2011)

Table 1-2. Index of prone-single hazard in regency/city index of vulnerable to floods by 2011.

| Indonesian Province prone to disaster hazards | Region | Score | Class | National Ranking (Indonesia) of Index Prone-Single Hazard & Vulnerable to Floods |
|---|--------------------|-------|-------|--|
| North Sumatra | Langkat | 70 | High | 1 |
| East Java | Pasuruan | 70 | High | 2 |
| Banten | Tanggerang | 68 | High | 3 |
| Central Java | Banyumas | 67 | High | 4 |
| Special Capital Region of Jakarta | North Jakarta City | 66 | High | 5 |
| Special Capital Region of Jakarta | East Jakarta City | 63 | High | 6 |
| Jambi | Kerinci | 61 | High | 7 |
| West Java | Karawang | 61 | High | 8 |
| East Java | Situbondo | 61 | High | 9 |
| South Sulawesi | Wajo | 61 | High | 10 |
| Central Java | Cilacap | 60 | High | 11 |
| West Java | Bandung | 59 | High | 12 |
| Special Capital Region of Jakarta | South Jakarta City | 58 | High | 13 |
| Central Java | Pati | 58 | High | 14 |
| East Java | Bojonegoro | 58 | High | 15 |
| East Java | Gresik | 58 | High | 16 |
| West Java | Bekasi | 57 | High | 17 |
| Central Java | Semarang | 57 | High | 18 |
| Banten | Tanggerang City | 57 | High | 19 |
| Central Java | Sragen | 56 | High | 20 |
| East Nusa Tenggara (NTT) | Belu | 56 | High | 21 |
| Lampung | South Lampung | 54 | High | 22 |
| West Java | Indramayu | 54 | High | 23 |

(Source: Local Disaster Management Agency, 2011)

Figure 1-1. The damage of houses caused by the disaster events in Indonesia by 2011.



(Source: BNPB, 2011)

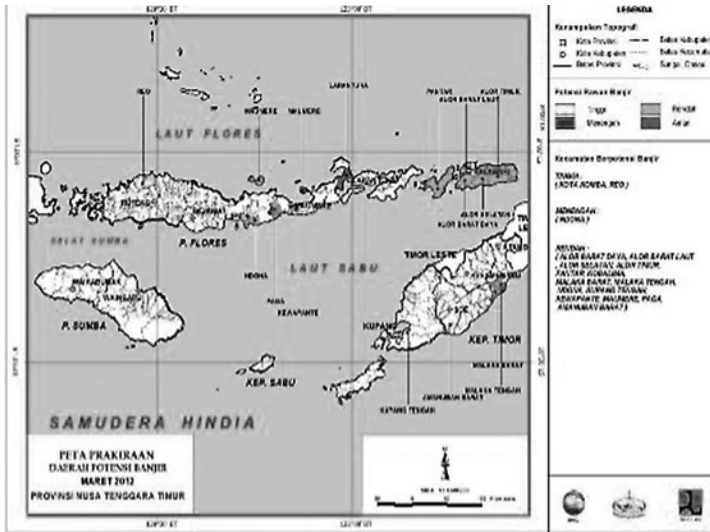
Belu Regency is one of the capital districts in East Nusa Tenggara Province, Indonesia. The capital of Regency is the city of Atambua that is the border center of West Timor, Indonesia, and Timor-Leste. From 1998 to 2011, the region was flooded every year due to the overflowing of the Banenain River. However, the most extreme flood occurred in 2001 which killed many people, mainly from Ainaro District, East-Timor (East Timorese Refugees) in the post-referendum between East-Timor and Indonesia; the refugee resettlement crisis from East Timor’s refugees to West Timor’s territories through the self-evacuation of refugees who moved and settled in the western region of East Nusa Tenggara Province.

Benanain River is located on Timor Island; North Central of Timor Regency (Timor Tengah Utara or TTU), South Central of Timor Regency (Timor Tengah Selatan or TTS) and Belu Regency, East Nusa Tenggara Province, Indonesia, and Timor-Leste. The river has a length of ± 73.11 km, with a catchment area of approximately ± 1,594 km², and has a riverbed slope of ± 0.0124. Every rainy season, the river overflows

and inundates most of the residential areas, settlements, gardens, and rice fields. The inundation area reaches $\pm 1,000$ ha, with an inundation depth of ± 1.50 m and inundation duration of ± 1 week (Kristijatno, 2008). Thus, it has caused a disaster (disturbance) that has a wide impact on financial losses (which are estimated to reach billions of rupiah and create inconvenience to settlements around the river) and has an impact on social problems. The case that the author presents is a large-scale flood due to a dike failure near, in part of Belu Regency. In every year, from 2000 until 2012 at present year, the dramatic year of big flood event happened where a dike in several sub-districts has been broken. However, by auctioning levee barrier, the disaster could be prevented a little, but the levee was always broken.

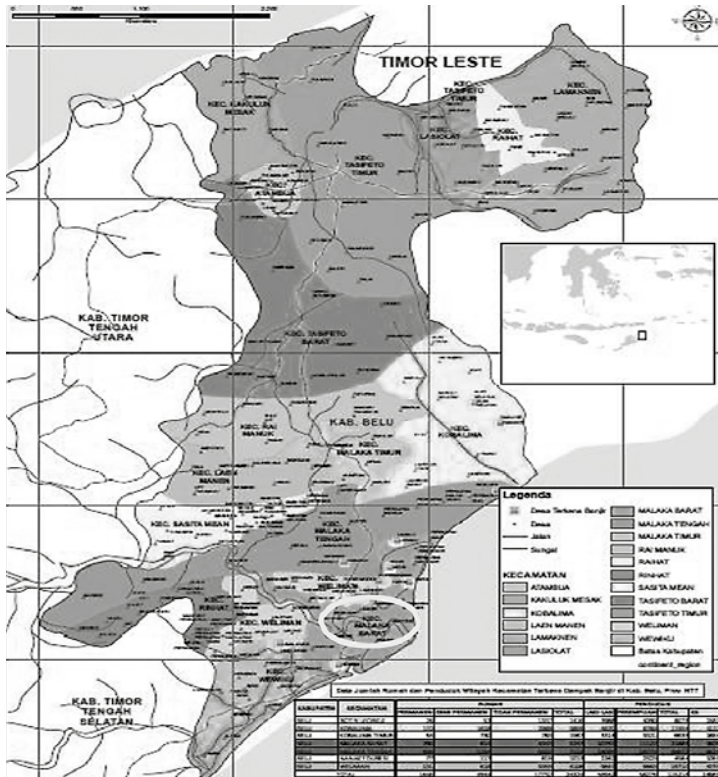
Initiatively, the local people who simulated the flood try assessing their capacity in both human and economic consequences because of the flood event. The forecast maps and areas map are affected by floods in Belu Regency, East Nusa Tenggara Province can be seen in Figure 1-2 and Figure 1-3.

Figure 1-2. Forecast map for flood, in March 2011 in East Nusa Tenggara Province, Indonesia.



(Source: BNPB, 2011)

Figure 1-3. Areas maps are affected by floods in Belu District, in 2011 in East Nusa Tenggara Province, Indonesia.



(Source: BNPB, 2011)

Local communities can continue their livelihoods despite flooding. This is due to the many factors involved that influence people’s knowledge such as their culture, the value of historical geography, and the principles and culture of anthropology, ethnicity, and sacred religion. Nonetheless, it is expected that the resources or capacity will not only come from the resilience of the local community/flood-affected communities to survive, but also from the government to properly build flood defenses on the Benanain River.

Communities in West-Malaka Sub-District must have the encouragement and a strong foundation as a disaster-resilient community and

have local knowledge as a resource or capacity of them to face and to mitigate flood hazards. Thus, with this resource or capacity, they can implement them to cope with the impacts of flood disasters. The most important community efforts for flood disaster mitigation are on the elements of resilience (i.e., natural capital, physical capital, social capital, human capital, and economic capital). These capitals are basic indicators to understand community risk perception and to improve their ability to develop and implement risk reduction strategies (Mayunga, 2007, cited in Bahadur, Adytia, Ibrahim, and Tanner, 2010). Community understanding in this case is their understanding of episodic and chronic flood events (e.g., flood depth/water depth, flood extent, and flood duration). In the research in this book, resilience can be implemented through Participatory Geographic Information Systems (pGIS) as a community-based approach to investigate the elements of resilience to flood events. In addition, it can help communities to recognize and understand local flood warning systems. Local flood warning systems can empower local communities, promote self-reliance, and encourage local community participation to reduce or prevent flood losses and damages (Alvarez et al., 2007). Therefore, professional judgement regarding the resilience and risk management of flood is required which should be addressed in this research to maintain community resilience's capitals to cope with flood disasters in the West-Malaka Sub-District, Indonesia.

1.2 Statement of the Research's Problem

In this book, the study of flooding, which is known as a frequent disaster in Indonesia, has been mitigated (efforts stage) by the local government, but not yet at the stage of ensuring the continuity of livelihoods, in this case the resilience assets of hazard-affected communities. To mitigate disasters, government regulations (plans and policies) are needed to overcome these problems. One of the mitigation programs was carried out by the local government, and the community-based disaster management (CBDM) is to conduct a disaster risk assessment that places more emphasis on resilient communities. But resilient communities in the pre-disaster, during disaster and post-disaster phases of flooding events have not been optimal in taking their role. So, of course this is a very crucial thing to be discussed here. The ability to recover among each individual community is different, so certain rules need to be made by the local government to achieve a good response

to disaster management. West-Malaka is known as one of the sub-districts in Belu Regency, East Nusa Tenggara Province, Indonesia that is subject to flooding every time the rainy season arrives.

In addition, the flood event is prominent in its long-lasting impacts such as the impact of flooding that threatens the livelihoods of the affected communities, and with the impact of death, which has killed approximately three hundred refugees from Ainaro District, Timor-Leste (East Timorese Refugees) in the year of the referendum process between Indonesia and East Timor in 1999 and 2000. History has recorded the flood event, that even though they have become residents (part of the indigenous community/people), but the local government in Atambua of Belu Regency and Kupang City of East Nusa Tenggara Province, Indonesia still does not have a mitigation direction to restore their livelihoods after the disaster (post-disaster). Besides, regarding watershed management in Belu Regency is not too focused on Benanain watershed while on Talau and Noelmina management watersheds.

On the other hand, there is not a clear regulation in supporting the management disaster in community resilience (no legal power to be disbursed the funds of the executive and legislative council). It was proven through less of political instruments and supports for flood resilience and flood mitigation; it is having not yet an implementation of a government regulation (*Peraturan Pemerintah/PP*) on protection of community resilience's assets in the ex-ante (before), during, and ex-post (after/recovery) flood disaster, certainty of applied disaster mitigation laws, and law of watershed management and land use planning in the riverbank areas of Benanain in Malaka-Timor, Indonesia. Moreover, it is not yet clearly determined how the budget mechanisms for the "one river, one plan, one management" of Benanain watershed will work out in the present and in the future.

Based on that fact, there is no serious action of Indonesian national and local governments to overcome the risk flood management and the safety of local people who live in the prone area of river flood disasters and their livelihoods or resilience assets to be restored. It is due to less dissemination of information and accessibility of Indonesian national and local decision-makers. Thus, this is being a reason that such serious case should be discussed on this research, to assess the sustainable of community resilience to cope with flood hazard/disaster in West-Malaka Sub-District of Belu Regency, East Nusa Tenggara Province, Indonesia.

1.3 The Originality of the Research

The originality of the book deals with the research study that is based on original research, and therefore the author needs to define what the original research of her study is all about by presenting and comparing the previous researchers in their research studies. Through this, a quality of research will be produced, new knowledge and information to be shared and discussed, to achieve research problem, research objective, research methods and approach, analysis technique and material of research and the result of analysis in the research study. The originality of the research as compared to the previous research can be seen concisely in Table 1-3.

Table 1-3. The originality of the research as compared to the relevant previous research in Indonesia.

| Title, Year, Area Study | The Objective of the Research | Research Methods and Approach | Analysis Technique and Material of Research | The Result of Analysis |
|---|---|------------------------------------|---|---|
| Resilience For The 2007 Flood Event, Using Community Knowledge: A Case in Part of Sukoharjo Regency, Indonesia 2011 | <ol style="list-style-type: none"> To generate the 2010 flood event map based on community knowledge. To analyze the community resilience on flood disaster | Participatory GIS/ Method Approach | Simple random sampling methods | <p>Community resilience: There are five major forms of capital in building community resilience in study area, namely resilience community natural capital, economic capital, physical capital, social capital, and human capital.</p> <p>1. Flood characteristics:</p> <ol style="list-style-type: none"> The distribution of flood in the study area was influenced by several factors, i.e., distance from river, general elevation, and broken dike location. The duration of flood was into classes: <ul style="list-style-type: none"> - Long - Moderate - Quick The losses of people are depending on flood depth, flood duration and flood preparedness conducted by people. |

Flood Resilience Perceptions of Community-Based Participatory Research

| Title, Year, Area Study | The Objective of the Research | Research Methods and Approach | Analysis Technique and Material of Research | The Result of Analysis |
|--|---|---|--|--|
| <p>Flood Risk Perception and Coping Mechanism of a Local Community: A Case Study in Part of Sukoharjo City, Central Java Province, Indonesia</p> | <ol style="list-style-type: none"> 1. To identify the characteristics of the local community and to identify as well as to map the local community perceptions of flood risk. 2. To identify the community's coping strategy related to flooding. 3. To compare the coping strategies between local community in Surakarta City and Semarang City. 4. To identify the proposed mitigation action plan based on the community perception. | <p>Focus Group Discussion (FGD) and participatory mapping</p> | <p>Purposive sampling based on the level of the community flood susceptibility</p> | <ol style="list-style-type: none"> 1. The characteristic of the local community and flood risk perception of the local community. 2. Coping mechanism employed by the local community in Surakarta City. 3. Comparison of the coping mechanism employed by the local community in Surakarta City and Semarang City. |
| <p>Vulnerability Assessment and Coping Mechanism related to Floods in urban Areas: A community based case study in Kampung Melayu, Jakarta, Indonesia.</p> | <p>I Main objective: To assess community level flood vulnerability including hazard perception and identification of element at risk and local coping mechanisms based on community surveys.</p> <p>II Sub-objectives:</p> <ol style="list-style-type: none"> 1. To determine the people's perception about flood risks. 2. To determine, identify, and classify certain elements at risk, which would be affected by flood in the study area. 3. To assess the vulnerability related to key elements at risk (structural types of buildings, building contents, and people's socio-economic characteristics). 4. To identify the current coping mechanism (coping strategies) employed by the local people and local government. | <p>Building inventory and household interview</p> | <p>Non-proportional stratified random sampling</p> | <ol style="list-style-type: none"> 1. People's perception related to flooding risks. 2. Identification and classification of certain elements at risk. 3. Vulnerability assessment related to key elements at risk. 4. The local people and the local government coping strategies. |

| Title, Year, Area Study | The Objective of the Research | Research Methods and Approach | Analysis Technique and Material of Research | The Result of Analysis |
|--|---|----------------------------------|---|--|
| Community based Approach to Assess Flood Risk Perception and Coping Mechanism along Code River, Yogyakarta Municipality, Indonesia | <p>I Main objective: To assess community level flood risk perception and coping mechanism in Code River.</p> <p>II Sub-objective:</p> <ol style="list-style-type: none"> 1. To assess the people's perception about the flood risk after 2010, Mount Merapi eruption 2. To identify the current coping mechanism employed by the local people. 3. To identify the local hazard management of the local government | In-depth interview and interview | - | <ol style="list-style-type: none"> 1. The assessment of flood risk perception and coping mechanism in Code River aftermath 2010 on Mount Merapi eruption. 2. The local people coping mechanism currently. 3. The local hazard management of the local government. |
| Improving Flood Hazard Vulnerability Assessment Based on Social Assessment in Bogowonto River, Indonesia | <ol style="list-style-type: none"> 1. To create a flood hazard map which includes community knowledge. 2. To map the element at risk (people, housing, and social economic condition) influenced by flood. 3. To assess the physical vulnerability (housing and other structures) and social vulnerability (people and social economic condition). 4. To analyze how the community copes with flood. 5. To integrate local knowledge with physical condition to assess people's perception of flood and their resources. | pGIS and interview | Systematic random sampling | <ol style="list-style-type: none"> 1. Flood hazard which includes community knowledge. 2. The map of the element at risk (people, housing, and social economic condition) influenced by flood. 3. The assessment of the physical vulnerability (housing and other structures) and social vulnerability (people and social economic condition). 4. The community copes with flood through thr traditional early warning system, <i>gotong royong</i> to help thr community to alleviate the damages and losses. 5. The integration and assessment of local knowledge with physical condition and people's perception of flood and their resources. |

Flood Resilience Perceptions of Community-Based Participatory Research

| Title, Year, Area Study | The Objective of the Research | Research Methods and Approach | Analysis Technique and Material of Research | The Result of Analysis |
|---|--|---|---|---|
| Community's Adaptive Capacity due to Coastal Flooding in Semarang Coastal City, Indonesia | To investigate the coastal community's response and adaptive capacity due to tidal flood hazard in the Terboyo Wetan Village and Trimulyo Village along the coastline of Semarang City | Inductively attaining data and concluding the result as in a descriptive manner via questionnaire | - | The local communities are aware of the tidal flood hazard, but this understanding did not manage to support their decision to leave the area. The community has adapted the tidal flood by simple physical adaptation strategy, such as increasing the floor level to prevent the flood water enters the house. |

Based on Table 1-3, it is concluded that there is a lack of resilience discussion. Therefore, this book discusses and elaborates with previous research studies to gain the research's aim at assessing local community resilience for flood disasters and to produce the flood hazard map according to the perception of the local people in the downstream villages of flood disaster regions e.g., Lasaen, Umatoos, and Fafoe of Timor, Indonesia.

1.4 Objective of the Research

The research's aim of this book is to assess local community resilience for flood disaster and to produce a flood event map according to the perception of the local people. The collected data is based on a participatory approach. The following is the objective of this research:

1. To produce a flood hazard map;
2. To analyze the community resilience to flood disasters.

1.5 Research Question

To avoid unformulated research problems of this research in this book, the following is the brief description in the form of question based on the objective of the research. The research objective and research question of this book are presented in this following Table 1.4.

Table 1-4. Research objective and research question.

| Research objective | Research question |
|--|--|
| 1. To produce a flood event/hazard map | <ol style="list-style-type: none"> 1. What is the flood frequency in flood regions? 2. What is flood distribution in flood regions? 3. What is flood duration in flood regions? 4. What is the water depth in flood regions? 5. What is level damage of flood in flood regions? |
| 2. To analyze the community resilience assets on flood hazard/disaster | <ol style="list-style-type: none"> 1. What is defined by community resilience? 2. How are community resilience assets in flood regions? 3. How can community resilience assets be quantified? 4. How is the relation between flood's risk and community resilience assets? |

1.6 Importance of the Research

This research of this book has been beneficial to the dissemination of information for:

1. The community:

Here, for community who has the resilience assets and who is experienced and adaptable about episodic and chronic hazards in risk assessment process, as one of the disaster mitigation conceptions, related to the hazard of flood's discussion. Community resilience is useful for protecting and sustaining livelihoods (more related to economic resilience and regional resilience) capability (more related to both human resilience and social resilience) in the study are to achieve a protective state in both aspects.

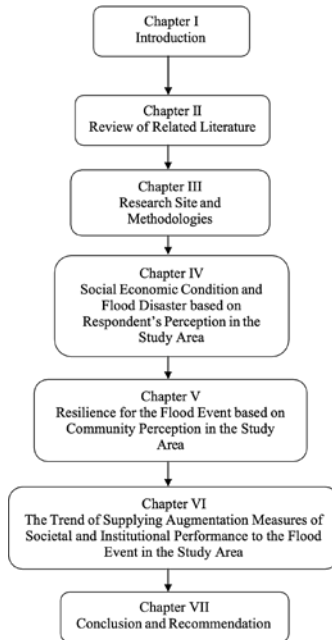
2. The local government and stakeholders

Here, the local government and stakeholders are expected to give protective and insurance conditions (health and financial assistance) as a form of government's intervention in terms of participatory management for the affected community such as the five resilience assets/capitals, e.g., human capital, social capital, economic capital, physical/infrastructure capital), and natural resource (nature capital). Besides, local wisdom of the community, which could be considered as a valuable resilience capital on the domain of culture and custom (cultural capital) in their perspective of what and how is a community wisdom, was shaped to help them cope with flood disasters. Political capital is based on the democratic voice of the af-

affected community to announce to government about their safety and livelihood (resilience assets). In this research, this capital is known as the capability of affected households and individuals to access/ receive their rights of having the implemented aids and assistance policy after a flood disaster occurred. While, law/legal capital is the product of regulations of the national and local decision-makers of the government that need to be evaluated and implemented by the policy makers (political capital) regarding ensuring the administration of water resources management and implementation of spatial planning, which is in accordance with government regulations to achieve the principle that embraces “one river, one plan and one integrated management” for protecting the regions affected by flood disasters, and for protecting the people and providing the helps for them to be recovered from the impacted resilience assets.

1.7 Outline of the Book

Figure 1-4. Structure design of the book.



The outline of this book is designed to understand the content of the research study. It provides the structure design phases on pre-fieldwork, on-going fieldwork, and post-fieldwork that author/researcher has conducted in the flood regions, i.e., West-Malaka Sub-District of Belu Regency, West Timor Island, East Nusa Tenggara Province, Indonesia.

Chapter I involves a general overview of research that presents and discusses the background of research, statement of the problem in research, originality of the research, objective of research question, the importance of the research, and the limitation of the study on definition of terms (key words of the study).

Chapter II presents theoretical foundations based on several study literatures related to this research. They are participatory mapping using the participatory Geographic Information System (pGIS), disaster, flood, coping capacity, and the concept of resilience.

Chapter III presents the research location and technical methods and substantive methods.

Chapter IV discusses the social economic condition and flood disaster based on the respondent/household's perception in the study area.

Chapter V analyzes and discusses the resilience for the flood event based on the community's perception in the study area.

Chapter VI discusses the trend of supplying augmentation measures of societal and institutional performance to the flood event in the study area.

Chapter VII draws a conclusion and provides recommendations.

1.8 Limitation of the Research Study on the Definition of Terms (Keywords)

To facilitate the readers' understanding and comprehension of this book, the following are some terms/key words related to the topic of this study that need to be clarified and presented:

1. Resilience

Resilience as the buffer capacity or the ability of a system to absorb perturbations, or the magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behavior (Holling et al., 1995, cited in Schroeder and Yocum, 2006).

In this study, resilience has its definition as the ability of community (source from their behavior or trained adjustment daily) to adapt, to resist on, to cope with, and to recover from a flood hazard/disaster that threatened their life and livelihood, and the region where they live. It has been viewed as a whole unit of adaptation, resistance, coping, and recovery systems that will be employed by the individual, community (local people of the study area), and Community Association for Disaster Management Non-Government Organization in Timor Indonesia after a seasonal flood disaster occurred.

2. Community Perception

The community perception is defined as the community's local understanding to cope with flood causes and impacts, as well as about their implemented strategies they use to prevent mitigate and cope with floods and protecting or surviving with their resilience assets. This perception in terms of its actual implementation in the affected region was addressed using a survey applied to the local inhabitants (Figueiredo, 2008) in order to know their knowledge and adherence to local wisdom to be used on the mitigation phase and resilience assets protection phase.

In this study, more specifically, community perception can be understood as the strength of community (community's endless awareness and efforts to learn from the flood hazard) to face, to overcome, and to minimize the flood disaster. Perception is defined in this research's section from the lens of flood disaster for analyzing the flood elements such as flood frequency, flood distribution, flood duration, water depth, flood damage, and communities' strategies straightly to be recovering from flood disaster.

3. Disaster

Disasters are undesirable and often sudden events causing human, material, economic, and/or environmental losses, which exceed the coping capability of the affected community or society. They are caused either by natural forces/processes (known as "natural disasters") or by human actions, negligence, or errors (known as "anthropogenic disasters") (CRED, 2009, cited in Jha, 2010).

In this study, disaster can be defined as unexpected phenomena caused not only by natural disasters but also by man-made disasters, which will lead the impact of disasters to socio-economical and

socio-ecological problems. Therefore, it is needed to have a strong community knowledge and the skill of capability to cope with the flood disaster.

4. Flood

Flood is defined as an overflow or inundation of water from a river or other body of water that causes or threatens loss of life and property and environmental damage (Ministry of Natural Resource, 2007).

In this study, flood can be defined as an overflow or inundation of water from a river or source of water (e.g., the Timor ocean) that causes some losses or threatens people's lives, in terms of several components such as losses of property (the contents of the house), losses of house, losses of crops, losses of livestock, lack of nursery services during evacuation/emergency response (limited crisis response), losses of cultural heritage sites, losses of fisheries, and lack of accessibility (huge disruption), losses of public infrastructure, i.e., roads, bridges, dams, broken dikes, etc.

5. Coping Capacity

Coping capacity is defined as the way people and organizations use their own existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event. To strengthen the people's coping capacity, they usually build a resilience system from their resilience assets to withstand the effects of natural and other hazards (Europe Spatial Planning Observation, 2003 cited in Thywissen, 2010).

In this study, coping capacity is defined in terms of the affected communities who used their coping mechanisms/capacities to deal with the flood disaster. It also can be defined as the capacity of community who experienced a flood event and/or institutions/organizations who capable to stimulate a risk reduction of a flood event/hazard before it turns out as a disaster; to provide the assistance and emergency responses and disaster planning for the affected community, affected livelihoods (resilience assets), and affected region(s) during a disaster occurrence (if it is unfortunately happens), and to anticipate the losses of a flood disaster by progressively providing the enforceable assistance that are documented in the law products and implemented by policy makers from the level of the local and national government, ensuring the recovery policy is implemented

in the long-run. Thus, the affected community can only use its existing resources/resilience assets for anticipating, coping, adapting and recovering from the flood event.

6. Participatory Mapping (Participatory GIS)

Indonesia supports the participation of local communities in the framework of democracy of the nation to agree in consensus meetings of stakeholders with local communities for the realization of natural disaster risk participation, given the many occurrences of natural disasters in the region and islands in Indonesia that are both easily accessible by the land transportation and the remote transportation and that are needed to be reached by air or sea transportation, such as floods region in Timor Indonesia. It is situated in the southern border area between Indonesia and Timor Leste which is located deep in the lowest-lying watershed areas of the Benanain river and Timor Ocean e.g., Belu Regency and Malaka Regency. Therefore, Indonesian Regulation regarding Disaster Management in 2007 Number 24, Clause 26 (1: e) of Chapter V is important as it is as a support or a stem of a holistic natural disaster regulation which is certainly valuable for the participation of local communities in remote-natural disaster areas that have strong of local wisdom. Since, the Law states that every person has a right to participate in disaster mitigation decision making, (CBRDM, 2005), this indicates that everyone participates and has a voice in determining the direction of management and operational policies for natural disasters at local, regional, and national scales, both from a substantive and technical perspective, such as ex-ante (before flood disaster happens), during flood disaster, and ex-post (after flood disaster happens) with its recovery management and technical mitigation measures as well as the mitigation operations of civil rescuing teams and the civil resilience assets of technical rescuing teams and other technical rescuing actions related.

In this study, it means that the affected community has its rights to their role as the ones who experienced hazards and disasters of flood to provide their local knowledge/perception in the production of information for flood risk management assessment and livelihood (resilience assets) assessment.