

**COMMUNITY- BASED APPROACH TO FLOOD  
DISASTER AND SOCIAL VULNERABILITY  
ASSESSMENT: THE CASE STUDY OF THE WEST  
TARUM CANAL- INDONESIA**

**THESIS**



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**POSTGRADUATE PROGRAM**

**PARAHYANGAN CATHOLIC UNIVERSITY**

**BANDUNG**

**JUNE 2017**



**APPROVAL OF THESIS**

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**June 2017**

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## DECLARATION

I, Muzungu Ibrahim do hereby declare that, this project paper with the title:

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TARUM CANAL- INDONESIA**

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If at a later date any violation is found in my work concerning education ethics, or if there is formal or non-formal demand from other parties relating to the authenticity of this paper, I am ready to bear all the risks, consequences, and/or sanction imposed on me.

State : in Bandung

Date : June 2017

  
Muzungu Ibrahim

**COMMUNITY- BASED APPROACH TO FLOOD DISASTER AND SOCIAL  
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TARUM CANAL- INDONESIA**

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## **Abstract**

This study explored community-based flood approach to disaster and social vulnerability assessment in West Tarum Canal. The objectives of this study were: 1) to describe the intensity of flooding, (2) To describe the level of social vulnerability along West Tarum Canal and 3) To develop a suitable framework for reducing future community vulnerability in the context of flood disaster management. This study used both qualitative and quantitative researcher method to achieve the above objective were by data was collected through field survey, interview, information collected by government departments, internet searches, libraries, published reports, surveys and observations. It based on pressure and release theory of (Blaikie et al. 1996), of measuring social vulnerability and CBDM were considered in this study respectively. The data was analyzed using Statistical Packages for Social Scientists (SPSS). The findings show the description of the intensity of flooding, level of social vulnerability and the framework for reducing future community vulnerability in the context of flood disaster management. This indicated that there exist significant relationships amongst the key variables of the study relating to social vulnerability and disaster management. The study recommends that pressure and release model (PAR) should be adapted to address social vulnerability and flood disaster along West Tarum Canal.

**Key words: community based disaster management, Flooding, Social vulnerability, West Tarum Canal, Indonesia**

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### **Abstrak**

Pendekatan dalam mengurangi kerentanan sosial melalui hubungan perencanaan dan komunikasi (untuk meningkatkan kesadaran masyarakat dan memobilisasi tindakan), aktivitas bottom-up (pengalaman, keterlibatan, dan penerapan) dan kemitraan manajemen dataran banjir. Tujuan dari penelitian ini adalah: 1) Untuk mendeskripsikan intensitas banjir. (2) Untuk menggambarkan tingkat kerentanan sosial di sepanjang Terusan Tarum Barat dan 3) Mengembangkan kerangka kerja yang sesuai untuk mengurangi kerentanan masyarakat di masa depan dalam konteks pengelolaan bencana banjir. Penelitian ini menggunakan metode peneliti kuantitatif untuk mencapai tujuan di atas yaitu berdasarkan data sekunder, informasi yang dikumpulkan oleh departemen pemerintah, penelusuran internet, perpustakaan, laporan, survei dan pengamatan yang dipublikasikan. Hal ini didasarkan pada teori kesenangan dan rilis (Blaikie et al 1996), dalam pengukuran kerentanan sosial dan CBDM sebagai pertimbangan dalam penelitian ini masing-masing. Data dianalisis dengan menggunakan Statistical Packages for Social Scientists (SPSS). Temuan menunjukkan gambaran intensitas banjir, tingkat kerentanan sosial dan kerangka kerja untuk mengurangi kerentanan masyarakat di masa depan dalam konteks pengelolaan bencana banjir. Hal ini menunjukkan bahwa terdapat hubungan yang signifikan antara variabel utama studi yang berkaitan dengan kerentanan sosial dan manajemen bencana. Studi ini merekomendasikan bahwa model tekanan dan pelepasan (PAR) harus disesuaikan untuk mengatasi kerentanan sosial dan bencana banjir di sepanjang Terusan Tarum Barat.

**Kata kunci: manajemen bencana berbasis masyarakat, Banjir, kerentanan sosial, Terusan Tarum Barat, Indonesia.**

## ACKNOWLEDGEMENTS

It is customary that we recognize and be grateful to all those who provide significant help towards accomplishment of something. Firstly, I thank the Creator, who is always there, for all his provisions and I wish to place on record my sincere gratitude to my supervisor, Dr. Pius Sutratman Kartasamita with whom I worked closely since 2016. This thesis would have not been completed without his constructive and outstanding knowledge in the field. I am grateful to have had the privilege of his excellent and articulate academic guidance, motivation, support and encouragement. I thank him for his patience and continuous support during difficult times when it seemed too difficult on my side. I have learnt a lifetime lessons from his open critical comments and discussion. My heartfelt thanks goes to my Examiners Dr. Pius Sugeng Prasetyo and Dr. Indraswari for their valuable guidance and encouragement thought the research process. For their critical observation and comments. I was able to learn a lot of things. I am greatly indebted to Development Countries Partnerships of the government of Indonesia (KNB) for sponsoring my master program for a period of three years.

I extend my appreciation to the head of department of master of social science, Dr. Gandhi Pawitan and general management of Parahyangan Catholic University for providing me with an enabling learning environment. I also pay tribute to my former lectures for their outstanding commitment, zeal and enthusiasm in giving quality education.

I am indebted to my beloved mother Nangujja Mary, I doubt that I can have enough words to express my appreciation to her for rising me. Lastly I would like to thank Dr. Muwaga Musa and the entire Mpaata family especially Hajji Muhammad Mpaata, Prof. Abdul K. Mpaata, Hajji Asuman Mpaata and Mr. Zaid Mpaata for all your moral and financial support throughout all my Education process may the Almighty God reward you all abundantly.



## LIST OF ABBREVIATIONS

BAKORNASPB	Badan Koordinasi Nasional Penanggulangan Bencana
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Planning and Development Agency)
CAP	Community Action Plan
CBDM	Community-Based Disaster Risk Management
DM	Disaster Management
NAP-DRR	National Action Plan for Disaster Risk Reduction
NGO	Non Government Organization
PERDA	Pemerintah Daerah (Military and Government / Local Government)
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
BNPB	National Agency for Disaster Management (Badan Nasional Penanggulangan Bencana) Regional Disaster Management Agency
BPBD	Badan Penanggulangan Bencana Daerah)
EOC	Emergency Operations Centre
IDRL	International Disaster Response Law, Rules and Principles
WTC	West Tarum Canal
ICWRMIP	Intergrated Citarum Water Resource Management & Investment Program
HH	Household
PDAM	Regional Water Utility Company) Bandung and Reservoir Operator/Authority of Jatiluhur, Cirata and Saguling
ADPC	Asian Disaster Preparedness Center
GOI	Government of Indonesia

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# CHAPTER 1: INTRODUCTION

## 1.1. Study Background

Flooding has been recognized as one of the worst disasters. It is one of the most frequent and expensive natural disasters in the world. Hundreds of millions of people around the world have been affected by floods. Floods lead to social and physical losses and may have significant impact on the economic condition of a nation. Indonesia is an equatorial, tropical country with around 17,000 islands. With a total population of approximately 237 million people (Center for Excellence in Disaster Management and Humanitarian Assistance 2015), (Nations et al. 2012) ,it is the fourth most populous country in the world. Indonesia is frequently hit by natural disasters. Almost regularly, Indonesia experiences floods, landslides, earthquakes, tornados, cyclones, tidal bores, and droughts. In the last decade, Indonesia has faced frequent, recurrent flooding every year in many parts of the country (Hapsari and Zenurianto 2016) Compared with other countries, Indonesia is considerably more vulnerable to flooding disasters It ranks third and seventh in the world in terms of flood occurrence and the number of people affected, respectively. (Sutardi 2004).

Flood disaster management in Indonesia has not been as widely implemented as expected, between 2004 to 2013, flood occurred annually and affected more than 12 million people (BNPB 2012), (Hapsari and Zenurianto 2016). Annual incidences of flooding were worst in 2008 and 2009; however, these events only appeared as “routine” mass media coverage. Environmental scientists believe that an increase in population, exacerbated by the effects of climate change, have contributed to these flooding catastrophes. Although much work has been done by the government of

Indonesia (GOI) to manage the flood problem, the complex issues, including budget allocation issue, awareness issue, and the need for expertise, remain challenges in achieving efficient flood risk management (Sutardi 2004).

West Tarum Canal (WTC), it has been operated since 1968 to supply water for irrigation in the Bekasi, Karawang region and drinking water for the Jakarta city. Recently, the WTC also began supplying the industrial area in Bekasi and Karawang. WTC begins at Curug Weir and ends at the Ciliwung River to the east of Jakarta at Curug Weir (BNPB 2012), Water from the Citarum River is pumped to the WTC using 17 hydraulic pumps with the capacity to lift water 1.5 m and pump it at a rate of 5.5 m<sup>3</sup>/s. Along the 70km of its total length, the WTC supplies water for an irrigation area of 57,6-00 Ha (25.06 m<sup>3</sup>/s), three water treatment plants (16.1 m<sup>3</sup>/s), and other industry and municipal areas (3.50 m<sup>3</sup>/s), while the people living alongside the canal pump the water illegally for household or small industry purposes. WTC was designed with the capacity of 82.5m/s but now the capacity is only 35m/s. the reeducation is being caused by sedimentation processes which as occurred in the base of the channel during the last 20years (Besar and Citarum 2013), Due to the declaim in its capacity, it has caused problem of flooding which affects the people around it almost annually.

Community-based approaches to disaster management have become increasingly important in a society faced with complex and uncertain change. Grassroots action can provide the local knowledge and social capital needed to identify the root causes of human vulnerability and generate adaptive solutions to confront livelihood and enhance resilience. Bottom-up activity can fill the gaps of previous top-down and centralized forms of management and reduce our reliance on short-term technological fixes and expert-driven solutions (Stewart 2007)

The absence of public involvement in institutional forms of disaster management for example (the legislated roles and responsibilities of government in disaster reduction) has allowed divergent disaster perceptions or disaster cultures to develop between



government representatives and the public who bear risk. lack of communication (Stewart 2007) and mediation of past management conflicts has created an atmosphere of distrust between governments and the public. Few opportunities exist to solve the operational problem (Sandman 1993)

Communities themselves struggle to act, as they have had little opportunity or incentive to be involved in the management cycle in the past. Communities have not developed grassroots social learning networks related to disaster. Building and maintaining such networks could help to unify public discourse (Dryzek 2005) and increase political representation in the creation of legislation and regulation to engage communities (Wagenet and Pfeffer 2007) Many communities do not have the extra resources or professional skills to initiate planning or adaptive solutions, and many are simply overwhelmed with existing development issues. A recent study on community-based disaster preparedness (CBDP) concluded that the success of community-based initiatives today is limited by (Clark 2007), Allen and Babus 2010).

1. Institutional procedures and funding arrangements of supporting organizations that limit community empowerment.
2. Divergent worldviews of stakeholders that affect relative negotiating power.
3. Initiatives that do not match the socio-economic and political context of community capacity.

Fostering resilient communities requires greater attention to understanding community vulnerability and building the social capital needed to increase participation at the local level. The social and political aspects of vulnerability deserve immediate attention if communities are to be engaged and pro-actively access cross-scale support linkages (Benson and Twigg 2009) and participate effectively in defining and reducing vulnerability. There is a need to develop social learning opportunities, or initiatives in the community that promote public involvement in observing, retaining and replicating behavior that leads to greater vulnerability reduction and community health. Social learning can also help to increase the public's ability to act and represent local interests in the decision-making process. New institutions can then develop that redefine community-government partnerships and instill a new appreciation for grassroots

activity and knowledge about social, economic and environmental conditions at the local level. Only then can risk sharing and knowledge transfer among stakeholders exist to generate the diverse solutions needed to adapt in the context of an uncertain and changing world

### **1.1.1 Community- Based Approaches to Disaster Management**

In the context of disaster management (Ophiyandri 2015), define community as ‘a group that may share one or more things in common such as living in the same environment, experiencing similar disaster risk exposure, or having been affected by a disaster’. Particularly for post-disaster reconstruction, People affected by a disaster are not victims; they are the first responders during an emergency and the most critical partners in reconstruction, undertaking the majority of work on their own recovery, without governmental, humanitarian support. A good reconstruction strategy is one that focuses on empowering communities, families, and individuals to rebuild their housing, their lives, and their livelihoods. To make this work, community members should be partners in policy making and leaders of local implementation (Damage and Policy n.d.)

Community based in disaster management, generally, refers to the involvement of people in projects to solve their own problems or to develop their socio-economic conditions. They participate in setting goals, and preparing, implementing and evaluating plans and programs according to Uphoff (1987 as cited by (Hossain 2014) described participation as a process of involvement of a significant number of people in situations and actions that enhance their wellbeing. Although those people and communities are directly affected by the disaster are the first to engage with the emergency, they are often perceived as being mere victims rather than the potential critical driving force behind reconstruction (Wardak, Coffey, and Trigunarsyah 2013)

Local communities and the survivors of disasters play a crucial role in post-disaster reconstruction and their participation ultimately determines project success. disaster reconstruction is a complex and highly demanding process that involves a number of

different and well-coordinated courses of action. Therefore, it is vital that these complex activities are well planned and subject to thorough consultation, and effective collaboration with a wide range of community members (Anh et al. 2013) community consultation is seen as a key component (Anh et al. 2013), communities affected by climate change still require assistance from external stakeholders (governments, agencies or experts) Very few texts underestimate the importance of community participation or using participatory approaches to create an effective resilient to disaster although the focus on sustainable reconstruction, community engagement/consultation is also considered to be a key factor. However, how to consult with communities in practice is still problematic

Communities play a vital role in rescuing human lives during the immediate post-disaster emergency and humanitarian relief. One study of community participation in the aftermath of the 2004 Indian Ocean tsunami revealed the significant role that the Aceh-Indonesia community played in disseminating information about the scale and effect of the disaster to relief agencies, when many government units did not function and could not provide this critical information. The information provided by local communities in Aceh-Indonesia, expedited relief efforts and established the way forward for planning of post-disaster reconstruction (Osti and Miyake 2009) Affected communities in Aceh- Indonesia also played a key role in establishing the identities of those individuals and families affected by the Tsunami, and their eligibility for assistance

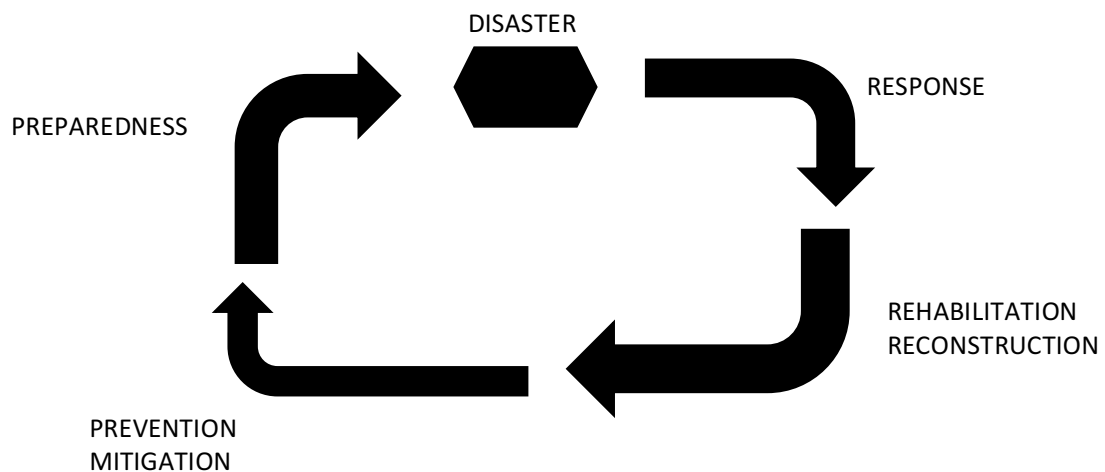
Thus, it is clear that community participation is important at all stages during and post-disaster reconstruction, and since a community is composed of different groups of people, suitable methods to include these groups proactively in the process of reconstruction need to be devised (Lloyd 2006) Attention must be paid to ensure that disadvantaged members of the affected communities, such as vulnerable women, children, the elderly and persons with disabilities are properly included during and in the reconstruction process, and that the design of post-disaster reconstruction projects responds to their fundamental requirements). Effective participation must begin with,

and be promoted by, effective community empowerment (Wardak, Coffey, and Trigunarsyah 2013) Therefore, the crux of community participation is the exercise of ‘voices and choices’ of the community and the development of human, organizational and management capacity to solve problems as they arise in order to sustain the improvements made over the time (Sandman 1993).

### 1.1.2. Disaster management cycle

Over the last few decades, there has been a continuous evolution in the practice of disaster management. Disaster management revolves around the concept of the 4 R's; Reduction, Readiness, Response and Recovery (figure 1.1). The traditional focus has been on the reduction and readiness phases of the cycle where governments have implemented preparation strategies (e.g. CDEM plans) as well as operational capacities (e.g. civil defence) for more timely and effective response to an impending event. Disaster management aims to reduce, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve rapid and effective recovery (Carter 1991)..

**Figure: 1.1 Disaster management cycle**



There is no doubt that the role of relief assistance during the response phase of a disaster will remain important. However, it is now more widely accepted that people should not rely on emergency services and Civil Defence in the aftermath of a major event because in reality the demand is likely to be so overwhelming for all agencies that it may take days before anyone responds. Therefore, as a result, disaster management has changed direction and now governments are trying to educate the public on the risks from the environment and what can be done to survive a disaster

This initiative has been endorsed by local councils, a range of businesses and some of the public who are – perhaps motivated at least partially by the frequency and severity of natural disasters during the past decade – progressively recognizing the value of sustained efforts to reduce the impacts of natural hazards. However, there are still many people who don't understand the risk from natural events particularly at a local level. These people are either unaware of the risks or are ignorant of the likely effects (i.e. they probably believe that an event of large magnitude won't occur in their lifetime or they will manage it when the time comes).

Risk awareness depends largely on the quantity and quality of available information and on the difference in people's perceptions of risk. Perceptions of risk differ between individuals as it is generally influenced on past experiences and knowledge. People are more vulnerable when they are not aware of the hazards that pose a threat to their lives and property (Vulnerability 2010).

### **1.1.3. Disaster Management in the West Tarum Canal**

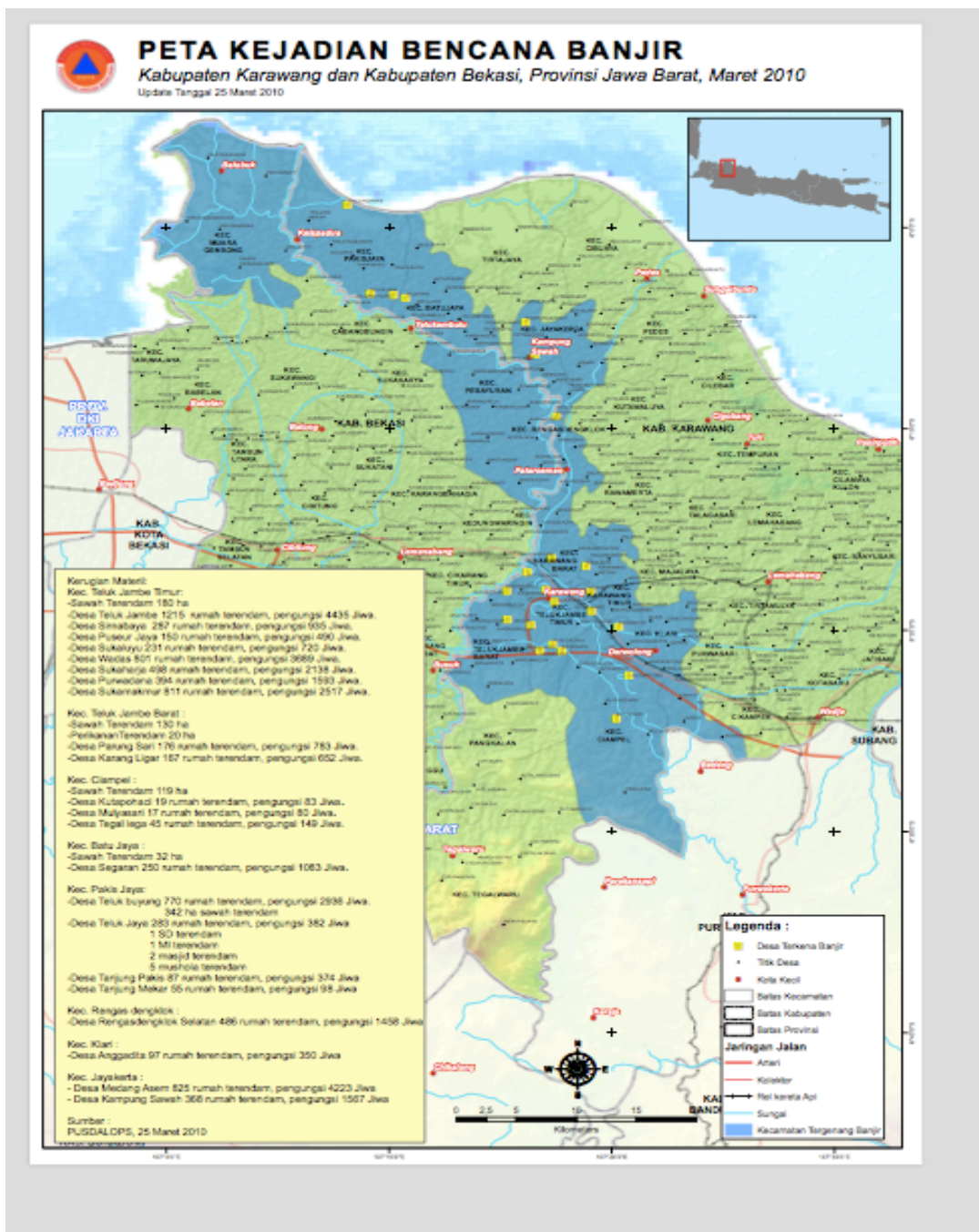
Disaster management in the West Tarum Canal provides a contemporary case study to explore the challenges that restrict community-based participation and grassroots action in floodplain management. In addition to a history of catastrophic flooding, the Disaster management in the West Tarum Canal faces emerging challenges (Ministry of Public Works 2007) extreme hydro-climatic events (Abarquez and Murshed 2004)

and development-related issues in rural agricultural regions. The uncertain nature of flood disaster at the local level and the presence of management conflict and poor stakeholder communication (ECHO, UNESCAP, and ADPC 2008) underscore the need to develop community-based approaches and to integrate these with the regional floodplain management (i.e. promote cross-scale linkages). However provincial arrangements in the floodplain have relied largely on engineered and command and control approaches to disaster management and development in order to protect communities from the catastrophic of flooding. Communities are encouraged to participate in mitigating local risks but are not empowered in decision- making processes. Social vulnerabilities have emerged that are marginalized from this dominant view of flood and floodplain management. Social factors, however, have implications for a community's capacity to act and sustain a motivated effort to participate in floodplain management

#### **1.1.4 Flooding in West Tarum Canal**

The West Tarum Canal (WTC) it has been operated since 1968 to supply water for irrigation in the Bekasi region and drinking water for the Jakarta region. Recently, the WTC also began supplying the industrial area in Bekasi. It begins at Curug Weir and ends at the Ciliwung River to the east of Jakarta at Curug Weir, water from the Citarum River is pumped to the WTC using 17 hydraulic pumps with the capacity to lift water 1.5 m and pump it at a rate of 5.5 m<sup>3</sup>/s. Along the 70km of its total length, the WTC supplies water for an irrigation area of 57,6-00 Ha (25.06 m<sup>3</sup>/s), three water treatment plants (16.1 m<sup>3</sup>/s), and other industry and municipal areas (3.50 m<sup>3</sup>/s), while the people living alongside the canal pump the water illegally for household or small industry purposes. WTC was designed with the capacity of 82.5m/s but now the capacity is only 35m/s. the reeducation is being caused by sedimentation processes which as occurred in the base of the channel during the last 20years

Figure: 1.2. Map showing West Tarum Canal and surrounded Area



Source adapted: BNPBD office visit 13<sup>th</sup>/04/2017

TABLE 1.1 FLOOD EVENTS IN KARAWANG AND BEKASI BETWEEN 2010

DISTRICT	VILAGE	FLOOD IMPACT		
		Houses	Rice field	Refugees
Teluk Jambe Timur	Teluk Jambe	1215		4435
	simbaya	287		935
	Puseur	150		490
	Sukaharja			
	purwadana	394		1593
	Sukamakmur	811		2517
Teluk Jambe Barat	Purug Sari	176	130ha	783
	Karang ligar	167		652
Ciampel			119ha	
	Kutapohaci	19		83
	Mulyasari	17		80
	Tegal Lega	45		149
Batu Jaya	Teluk buyung	770		2936
			32ha	350
Klari	Anggadita	97		350
Jayakarta	Medang Asem	825		4223
	Kampung sawah	368		1567
Pakis Jaya	Teluk buyung	770		1083
	Teluk Jaya	283		382

Source: PUSDALOPS, 25 May 2010

Historical hydro-climate data, combined with the observed flood record, has allowed for an historical analysis of the West Tarum Canal that has shown flows of the canal to



be erratic and highly variable, This is because the West Tarum Canal lies within a bioclimatic transition zone that is a divide between a sub-humid boreal forest region and a humid, semi-arid parkland region. The basin is very sensitive to precipitation and temperature variations that influence evapotranspiration rates and river runoff ratios. Residents along the length of the West Tarum Canal have, therefore, had to deal with floods and droughts from variable physical conditions in the basin. These natural processes have been further complicated by intense urban and rural development that poses a number of water concerns in addition to flooding ((Ministry of Public Works 2007)

- Decreasing wetlands and natural recharge potential from development;
- Development impacts (i.e. roads, urbanization) on water flow, tables and aquifers;
- Cumulative drainage impacts that increase bank erosion;
- Sedimentation in the river;
- Excessively low water tables during drought years;
- Irrigation projects for increasing commercial farming needs; and,
- Water quality (industry sewage lagoons).

A renewed awareness of complex and uncertain water quantity and quality issues such as these, and the highly variable nature of flooding in the West Tarum Canal, has prompted the West Java government to prepare an integrated water strategy. A holistic approach to long-term planning, sustainability, and the consideration of all key components within a watershed are the foundations of this new vision. These insights and policy directions will bring changes to the conventional roles and responsibilities found in provincial floodplain management.

### **1.1.5 Indonesian government Response to Flood and Floodplain policy**

The National Coordination for Natural Disaster body was the first national organization for DRM in Indonesia, established in 1966. In 1979 it was revised by Presidential Decree No. 28 and renamed the National Coordination Board for Natural Disaster Management. In 1990 the need to include human-made disasters as subject matter for Indonesian DRM prompted changes to the board based on Presidential Decree No. 43. With those changes, the board changed its name to the National Coordination Board for Disaster Management.

Before decentralization in Indonesian, Law No 11/1974, in the constitution gave all power of flood control management activities to the Central government under the Ministry of Public Works to plan and make strategic flood control management, (Indonesia Constitution 2002), In section 3 of this law it stated that “the Ministry of Public Works has the authority and responsibility to coordinate the macro planning, technical planning, supervision, and implement water resource management related to the flood control infrastructure development”.

In line with Law no. 11/1974, Government Regulation No. 22/1982 was issued. according to this regulation, the development plan on Water Resources was provided by the Ministry of Public Works in the country and had the authority to appoint, establish institutions and organizations in national or regional level to perform certain tasks related to water management such as flood control infrastructure development and management. The Regional level authorities (provincial government and lower level) were responsible to perform specific administrative task delegated by the central government.

Basing on regulation No 22/1982, several institutions were established by the Ministry of Public Works to perform several tasks related to flood control infrastructure development and management (Bruns et al. 2001), The planning and constructing of

the flood control infrastructure for Citarum river Basin was under the Ministry of Public Works supervision. The day to day management was delegated by the Ministry to the Director General of Water Resources Development and Several sub departments under the Director General of Water Resources Development were established to conduct specific tasks related to water resources development and project.

The Directorate of Planning and Programming was in charge of the feasibility study of the water resources development project and giving guidance to implementation agencies in respect of program arrangement, determination of development implementation priority and funding arrangement.

In 1999, after the fall of Suharto's regime, Indonesia was transformed from centralization to decentralization through the establishment of Law No. 22/1999.<sup>(1)</sup> (Presiden 1999), This law transferred functions, personnel's and assets from the central government to provinces, as well as the district and the municipal governments (see, Indonesia Constitution 2002) and Indrayana 2008), This means that additional powers and responsibilities were devolved to the regional level (provincial and district governments) establishing a far more decentralized system compared to the co-administrated systems of the past.

Further changes to the form of the DRM Board in Indonesia have occurred since then. In 2001, the board changed name again to the National Coordinating Board for Disaster Management and Internal Displaced People (Anonim 2001). This new board was based on Presidential Decree No. 3. It sat under the Ministry of Social Welfare. Changes were again made in response to the extraordinary scale of the impact of the 2004 Aceh Tsunami. These changes were based on the ratification of the Government Rule No. 83 in 2005. The board was renamed the National Coordinating Board for Disaster Management <sup>(2)</sup> (Presiden 1999) Even though there were changes to the form of DRM

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organization in Indonesia from 1966 to 2005, the core characteristics of past management patterns were reactive actions from government in response to a disaster. A variety of different types of government organizations had similar functions in that they reactively coordinated other ministries or other government agencies in responding to disaster events. They were ad hoc governmental agencies for handling disasters. The ad hoc nature meant that the agency had a role only in supporting other government agencies for particular events. This arrangement at the national level also became the pattern at the local levels (both provincial and municipal). Therefore, the coordination placed a greater focus on the emergency response rather than an integrated approach to disaster management.

Emergency response as a result of reactive actions proved to be an insufficient response to disaster events in Indonesia particularly after the Aceh Tsunami in 2004. The Indonesian Government then ratified Act No. 24 on Disaster Management in 2007. The Act put in place a more comprehensive approach to disaster management that includes the following three points:

1. Provide a legal basis for establishment of the new government boards with more authority for disaster management. The boards will have the same level of jurisdiction as other ministries at national level or other agencies at local levels.
  2. Integrate the stakeholders' adaptations from the mitigation to recovery stages of the DRM cycle. The Act requires that all disaster management boards (national, provincial and municipal) have specific platforms and plans for disaster management.
  3. Integrate disaster management with other public policies at all the government levels. The integration process aims to improve the effectiveness of disaster management such as integration with the spatial planning system, building codes, education systems, and in the infrastructure development.
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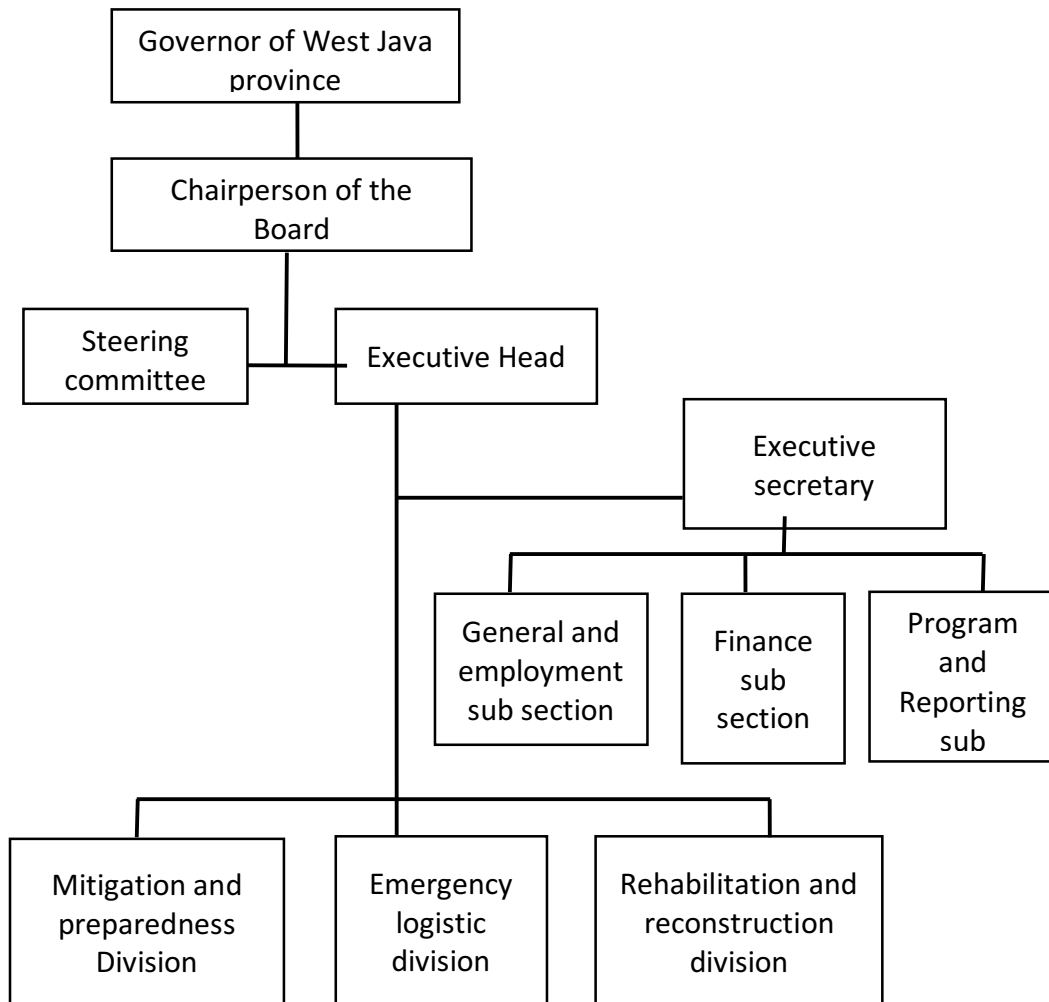
At the provincial level, in relation to Act No. 24 on Disaster Management in 2007 (Agency and Management 2007) West Java Province had already established a Regional Disaster Management Board (BPBD). The board is directly under the provincial governor of West Java Province. The existence of the board indicates that the provincial government has specific interests and concerns for DRM.

Regional government has more power to direct policy related to flood control management. The legitimacy of a certain flood control infrastructure project inside the province is not decided by the central government anymore. Regional government can perform or formulate a project or policy related to flood control infrastructure without need an approval from the central government. They also become more responsible to respond to flood since their position is appointed by the citizen.

The autonomy and decentralization laws put a greater pressure on the Provincial authorities in many aspects of flood control and management. The structure relation between central government and provincial government or lower level is changed from centralized and co-administration form to more centralized

The changes imply that the provincial authorities are now ultimately responsible for flood control management and addressing flood damage in West Java province where before the responsibility was handled by the central government.

Figure 1.3 describes the structures for an integrated approach to disaster management in West Java Province by including the aspect of Mitigation and Preparedness, Emergency and Logistics and Rehabilitation and Reconstruction

**Figure 1.3. Disaster management in West Java Province**

Source adapted from : (Wibowo, Surbakti, and Yunus 2013)

### 1.1.5.1. Key institution Involved in these arrangements

**table 1.2 institution Involved**

<b>PJT II</b>	is a state-owned company which manages the water resources for raw water supply in the areas of Citarum river and The channel that supplies water to Jakarta is the WTC with intake at Curug.
<b>Disaster Management</b>	<ul style="list-style-type: none"> <li>➤ To have effective disaster preparedness plans in place for floods and mud flow events.</li> <li>➤ To have appropriate works in place to minimize the physical impacts of floods and mud flow events. Disaster Management</li> <li>➤ To have effective drought management plans in place where available water falls seasonally below design expectations.</li> </ul>
<b>Data and Information</b>	<ul style="list-style-type: none"> <li>➤ To have a comprehensive database on land and water resources in place and in a form that is accessible to all that need it to facilitate sustainable management of the basin's water resources.</li> <li>➤ To use community participatory methods where ever applicable for data collection and verification.</li> <li>➤ To have effective arrangements in place for “custodianship” of the different water and catchment related datasets.</li> <li>➤ To have effective data sharing arrangements in place among agencies within the basin and with central agencies.</li> <li>➤ To have suitable models and decision support tools developed and operational to assist rational decision making about water resource management. Data and Information</li> <li>➤ To have research programs in place to fill gaps in knowledge about water related processes and scenarios.</li> <li>➤</li> </ul>
<b>Environmental Protection.</b>	<ul style="list-style-type: none"> <li>➤ To have comprehensive land use plans in place, and adhered to, in order to minimize the impacts of human activities on the environment.</li> <li>➤ To have forest protection measures in place and have no further reduction in the existing forest area.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ To have priority catchments improved through reforestation and adoption of appropriate land use and agricultural practices to minimize erosion.</li> <li>➤ To maintain biodiversity, without further degradation.</li> <li>➤ To have minimal pollution from domestic, industrial and agricultural sources entering the waterways of the basin.</li> <li>➤ To provide adequate water share for ecological maintenance (environmental flows), for example, minimum dry season flow to prevent salinity intrusion, sedimentation and pollutant accumulation near coastal areas.</li> </ul>
<p><b>Community Empowerment</b></p>	<ul style="list-style-type: none"> <li>➤ To have a high level of awareness of local communities about conservation, utilization and protection of natural resources (including their rights and responsibilities) in the basin.</li> <li>➤ Local communities to have the opportunity and forum to participate meaningfully in the planning and management of the water resources of the basin. Community Empowerment</li> <li>➤ To have the enabling conditions (institutional, financial and capacity) in place for local community involvement in provision of local water supply and sanitation services, watershed management and waste management</li> </ul> <p><b>Source: (Participation, Water, and Management 2016)</b></p>

### 1.1.6 Social Dimensions of Vulnerability in flood plain

The social dimensions of vulnerability to climate change have not been sufficiently recognized in adaptation policy. A variety of personal, environmental and social factors are involved in the conversion of external stresses into losses in well-being. Adaptation policy often focuses on personal and environmental factors. With respect to flood, personal conversion factors include biophysical sensitivities associated with age and health. Environmental factors include the physical attributes of the neighbourhood, such as the amount of green space, and characteristics of the housing such as the elevations of residential buildings. However, while these are important, adaptation



policy needs also to address more clearly social factors, which are less often invoked in discussion of climate policy. Specifically, social conversion factors will include income inequalities, the existence of social networks and the social characteristics of neighbourhoods (Lindley et al. 2011).

Most floodplain policies have traditionally focused on structural mitigation and recovery compensation programs provided by provincial partnerships, there may be a public reliance on centralized floodplain management. The influx of help and the related dependency have created little incentive for communities to capitalize on their own resources (including local knowledge and practices). Public aid has also created dependencies at local level (Dekens 2007) Monitoring and providing gratuitous relief for unpreventable natural calamities such as floods its not new. Thus the government has created a relief mentality that fosters expectations and reliance on government aid yet the national disaster relief and reconstruction funds have not kept up with the growing demand, people affected by disasters play a crucial role in disaster preparedness and mitigation, but their knowledge is often ignored by both international aid agencies and by their national and regional governments. The failure of relief aid following the 2004 tsunami, for example, is now being attributed to a general misunderstanding of people's needs and practices (Dekens 2007).

#### **1.1.6.1 Indicator of social vulnerability in West Tarum Canal**

According to (Badan Pusat Statistik Indonesia 2013) the situation regarding poverty and access to water supply and health facilities in the districts and municipalities that lie along West Tarum Canal fully or partially in the Citarum river basin can be summarized as follows

- A poverty headcount of 2.8 million or 9.7% of the basin population with poverty levels of the total populations ranging from 1.5% to 4.8% in the municipalities (which are totally urban) and 2.9% to 26.4% in the districts (which have a mix of urban and rural populations). In some districts poverty is

more prevalent in the urban population compared to the rural population, in other districts it is the reverse—there is no clear pattern.

- Access to clean water in the municipalities varies 77-97% of total population (poor and non-poor), whereas in the districts it is lower and lies in the range 37-87%; coverage is significantly lower amongst the poor in all areas except Bekasi and Karawang where levels between poor and non-poor are similar.
- Coverage of households with toilets in the municipalities varies 94-100% of total population, whereas in the districts it is 53-89%; in many areas coverage is significantly lower amongst the poor, but in others (Bekasi, Karawang) coverage is similar between poor and non poor.
- The comparison between poverty and coverage of households with clean water and household with toilets shows that there is a general trend between low poverty and high coverage of water and toilet facilities, and higher poverty and lower coverage of facilities

## **1.2 Research Statement**

According to (Methodology et al. 1998) they argue that the research process begins with the recognition of a problem or opportunity. According to (Christie 2000) research can be described as a systematic and organized effort to investigate a specific problem that requires a solution. This means that the first step identifies a problem and clarifies the aims and objectives (research questions) of the study that the researcher intends to achieve. The social and political dimensions of flooding have received attention in Indonesia due to increased flood events in the West Tarum Canal. Community participation has been encouraged in floodplain policy and through the establishment of nongovernment organizations to link communities with decision-makers. However, communities have not been engaged and active in floodplain management and decision-making. Catastrophic floods continue to dominate disaster management priorities and marginalize the root causes of vulnerability that threaten community resilience. Ineffective public involvement in regional decision-making,

communication, information sharing and the public's acceptance of disaster; these are essential for cross-scale collaboration. The aim of this study was to assess community-based hazard and social vulnerability in relation to flood disaster management strategies in response to residents of West Tarum Canal that are affected by floods almost annually

### **1.2.1. Research questions**

1. What is the level of intensity of flooding in West Tarum Canal?
2. What is the level of physical and social vulnerability to flood in study area?
3. How can vulnerability be incorporated into other public policies, particularly in Indonesian planning systems, in order to enhance community resilience to future flood disasters?

### **1.2.2. Research objective**

1. To describe the intensity of flooding in the West Tarum Canal
2. To Describe the level social vulnerability in West Tarum Canal;
3. To develop a suitable framework for reducing future community vulnerability in the context of flood disaster management.

### **1.2.3. Conceptual contribution**

The broad goal of the research was to make a contribution to flood disaster management research in the context of floodplain ecosystems by developing a case study of the West Tarum Canal. The research expands on a conceptual framework of social vulnerability in the context of developed floodplain societies. Previous studies on social vulnerability have given attention to socio-economic and political factors that impact the most vulnerable populations in less developed and high-risk societies. Vulnerability studies in more developed societies have focused on the identification of socio-economic and demographic characteristics of populations susceptible to sudden flood disaster in extremes in flood prone regions.

Recently, the climate change community has expanded on these studies by exploring social vulnerability in the context of society's capacity to cope with, and adapt to, long-term global change and uncertainty. However, an integration of these approaches to social vulnerability in the context of floodplain management, has not received adequate attention. By applying a holistic understanding of social vulnerability in floodplain management, can better encompass strategies to enhance coping capacity and adaptation in the context of floodplain ecosystems.

The methodology contributes to participatory action research in floodplain management by providing a role for communities and citizens of the West Tarum Canal to be experts in defining local disaster and assessing vulnerability. The action research encouraged citizen empowerment and the development of operational tools for anticipatory disaster reduction and planning. The methodology integrated an aggressive involvement and action planning strategy, with empirical knowledge, to provide detail regarding floodplain hazards and other aspects of life in floodplain communities. By integrating potential future disaster from climate change into flood risk management, the methodology presented the opportunity to investigate how residents, planners and decision-makers understand and cope with uncertainty.

The practical implications of the work draw from the conclusion that social vulnerability exists in the West Tarum Canal, and has negative consequences for conventional floodplain management. For community officials and decision-makers, these implications mean that financial and human resources must be devoted to improving communication linkages, raising public awareness, and mobilizing action to address socio-political vulnerability at the local level. For policy, the research implies the need to foster multi-stakeholder partnerships to address the current gaps in floodplain management that are caused by social vulnerability.

### **1.2.4 Organization of Thesis**

This study is presented in seven (7) chapters. Chapter One presents an introduction that sets out the main purpose and focus of the study, thus to assess Community based flood disaster and vulnerability in the West Tarum Canal. It outlines the research questions and objectives and clarifies the terms and concepts as applied in the study. More especially, it presents the study area and social problem that have necessitated this research work. The Chapter Two, the literature review, discusses in detail international and national data on natural disasters which are of relevance to the study. The diagrammatical illustrations presented in the theoretical framework serves as a structural “skeleton” for the entire work by providing a guide in the presentation and analysis of the research findings.

The Chapter Three, methodology, explains and justifies the choice of research strategy. This is discussed against the outstanding debate between qualitative and quantitative research methods. The sampling techniques, tools for data collection, ethical issues and the challenges encountered during the fieldwork are also discussed in this chapter.

The Chapter Four describes the findings, Chapter five gives the interpretation of data in the light with the theoretical framework presented in the literature review and the Chapter seven presents a summary of the key research findings in view of the study’s objectives. It also discusses the implication of the key research findings to community based flood disaster and social vulnerability assessment in West Tarum Canal. And finally concludes the study by showing how the research findings relate to some pertinent issues raised in the introduction of Chapter One.

