

Climate change and commuting

A case study on commuting Unika students dealing with floods



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Abstract

Climate change threatens cities all over the world and especially those in developing countries are at risk. South East Asian countries urbanize rapidly and the expanding cities, especially in coastal areas, are put in a vulnerable position for threats such as floods. Floods are one of the most severe climate change threats for Indonesia and the city of Semarang on Central Java. It threatens the livelihoods of those living in the city's flood prone areas including their commuting possibilities. Floods damages the roads and the high water levels on the streets make it difficult and risky for commuters to get through. Understanding changes in commuting patterns is essential for sustainable city development. This research aims to contribute to the understanding of the ways in which commuters are influenced by floods in their commuting processes. What experiences do people living in flood prone areas have with these floods and what decisions do they make for trying to commute when dealing with floods? To understand the severity of the problem this research focuses on students in Semarang as a highly mobile group of commuters. Twenty students of the Soegijapranata Catholic University (UNIKA) living in flood prone areas were selected as respondents by using snowball-effect sampling. The students were interviewed about their commuting behavior during floods and what flood experiences they had in their living area. Observations were made by going to the flood prone living areas of some of the students to see their living conditions, the neighborhoods and the roads they take.

The results of this research reveal that the students are mostly capable of commuting during floods by making various changes in their commuting decisions; using a different mode of transportation, taking a different route, leaving home earlier or living somewhere else temporarily. However despite these changes commuting during flood was still difficult and sometimes even impossible. This research wants to carry out that even for a highly mobile group such as students, it is challenging to commute when dealing with floods. The flood impact on people with less commuting possibilities can be expected to be more severe. In addition floods and climate change threats are expected to get even worse and the possibilities for the commuter needs attention by improving infrastructure in expanding cities like Semarang, in order for them to develop sustainably.

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1. Introduction

1.1 Background

“4,000 houses in North Semarang district, which has been regularly hit by floods, were still inundated up to 40 centimetres deep.” (Rohmah and Makur, 2013)

“Floods have inundated tracks at several railway stations in Semarang, Central Java, after heavy rains in the city and its surrounding area since Friday. Railway tracks laid between Tawang station and Alastua station were flooded, delaying dozens of journeys that passed through the city” (Suherdjoko, 2013).

“Setiawan (38), a Tanah Mas resident, said in Semarang, Wednesday that he could not go to his office because all roads towards his office area were flooded” (Antara news, 2011).

This research focuses on the city of Semarang, the fifth largest city of Indonesia which is located on the north coast of the densely populated island of Java (AISEC, n.d.). Semarang is one of many cities in Southeast Asia that have to deal with an increasing frequency and severity of floods over the last decades (Torti, 2012). Climate change and global warming are causing changes in air and water temperature, more extreme weather events like heavy rainfall, rising sea water levels and floods (Worldbank, n.d.; El Sioufi, 2010, p. 2). Developing countries such as Indonesia are most vulnerable for these effects while developed countries, of which most are assumed to having caused global warming, are much more capable of protecting themselves (El Sioufi, 2010, p. 3).



Figure 1: Map of Indonesia & Java (Source: Semarang Maps and Orientation, n.d.)

Rising levels of unplanned or mal planned urbanization in developing countries can put more pressure on the cities capabilities of dealing with the floods. Head of the United Nation Office for Disaster Risk Reduction (UNISDR) states;

"As the urban sprawl of rapid urbanization expands outwards and upwards, it provides ready opportunities for hazards such as floods, storms and earthquakes to wreak havoc" (Singh, 2012).

Research from the United Nations Human Settlements Programme (UN-Habitat) mentions extensive rural areas will be expected to transform into urban areas (El Sioufi, 2010, p.1). The rapid increase of urbanization is putting more and more pressure on Semarang's drainage systems which causes cities to be more vulnerable for different types of floods. The drainage systems cannot handle all the water despite the improvements made yet (The Jakarta Post, 2013). Last January the West Flood Control Canal, with the function of accommodating exhaustive rainwater, soon appeared to be insufficient to prevent the floods (The Jakarta Post, 2013). The water problems are causing negative effects including damage to private and public properties and the disturbance of different activities in the city (Jones, A., 2013; Dewi, 2007, p. 3).

Harwitasari and Van Ast (2011, p. 3) describe three types of flooding that occur in this area. The first type is local inundation, mainly caused by rainfall, the second is water flow from the hinterland causes river flooding and the third is high tide from the sea. The water level of the ocean is influenced by climate change and rose 7.43 cm a year between 2003 and 2008 (Harwitasari & Van Ast, 2011, p. 3). The effects of the floods are intensified by land subsidence with an average rate of 6 cm per year (Harwistasari & Van Ast, 2011, p. 4).

For years the local government has been taking measures to prevent and recover the city from the consequences of flooding. Despite these efforts many problems continue to exist whilst the impact of floods is expected to be even more severe (Marfai et. al., 2008, p. 246). Damage caused by floods to the infrastructure such as roads have multiple effects on the city's community. It can disrupt the lives of people and businesses (Jha, 2012, p. 153). During periods of flooding citizens of Semarang encounter problems in performing their activities, including commuting to work or study, with the height of the floods water level determining the travelling possibilities. A research of Marfai et. al (2007, p. 243) shows 47% of the respondents were not able to travel to work when seawater tide rises up to 50 cm.

"People are not able to go to work due to the roads in the neighbourhood areas are blocked by inundation" (Marfai. Et. al., 2007, p. 243).

Some residents do not leave the house because they expect things to get worse due to larger floods (Dewi, 2007, p. 42). However there are still enough people dealing with floods who are able to commute to their work as is shown in a research by Dewi (2007, p. 42 & 45); 40% of the respondents would still go to work during the floods, which means they are able to deal or cope with the floods.

A number of studies have been carried out on the flood effects in Semarang and the influence on the lives of its inhabitants and their coping strategies or adaptation responses (see for example Dewi (2007) and Harwitasari (2011)). None of these studies however focussed specifically on the effects of flooding on commuters living in flood prone areas. Are

people still able to commute during these flooding events and if so how do they manage to do so? What decisions do they make regarding commuting? These questions are important because understanding commuting patterns are essential for the successful development of cities (Artis et. al., 2000, p. 1432). The climate change threats are becoming worse for cities all around the world which calls for efficient planning of sustainable cities than can meet the needs of the people living in it. This study focuses on the students of Unika (Soegijapranata Catholic University) living in flood prone areas who commute between home and the university. How do floods influence the possibilities and decision making for these students to commute? How do they experience and cope with the floods and its effects for commuting?

1.2 Research relevance

Urbanisation and the expansion of cities means larger populations live in city environments with higher concentrations of economic activity's and important infrastructure (Hallegatte & Corfee-Morlot, p. 1, 2010). Climate change threats to urban infrastructures can include increased strain on equipment and materials and cause transport disruptions (Jabareen, 2012, p. 220). The Asian continent exist of many developing countries urbanizing at a fast rate and it is predicted that 65 per cent of the world's urban population will live on this continent in 2050 (El Sioufi, 2010, p. 1). The urban population in Indonesia has been rising rapidly for the past 10 years (and before) with 68 percent living on the island of Java (Firman, 2012). The increasing urbanization processes in Indonesia can also be seen in the city of Semarang. More houses are built and infrastructure keeps getting developed and expanded. However this has not improved the needs of all citizens living in the area, as the rising amount and severity of floods causes more and more problems for daily travelling and commuting possibilities. More parts of Semarang will experience tidal floods because of local inundation. The elevation of roads in these areas can sometimes help traffic but is causing the effects of the floods to be even more severe for houses near the road that do not get elevated. Also not all roads are getting elevated, making it even harder to access the elevated roads.

It is clear much needs to be done in order to solve these problems. In reaction to the rising problem of floods caused by unplanned urbanization head of the UN Office for Disaster Risk Reduction (UNISDR) Margareta Wahlström states;

"The evidence on increasing flood risk should be the tipping scale for governments, countries and communities to develop new systems to protect populations from floods given that current measures are proving to be ineffective in extreme situations." (Singh, 2012).

Knowing commuting patterns are essential for making efficient choices in the development of cities (Artis et. al, 2000, p. 1432). Therefore understanding the problems caused by flood which daily commuters have to deal with are essential for the future of expanding cities. This study can contribute to this understanding as it looks into full-time students at the University of Unika, who travel frequently to that location. Therefore alone they are a relevant group for getting to know more about their commuting experiences with the floods. However they are also relevant as a group who is able to go to the University and invest in their future. Despite the fact they live in flood prone areas and having to deal with these problems, they are not necessarily bounded to that place for their whole lives. They can decide for themselves if

floods are a reason to take action. Unlike many other studies this research does not focus on people who are bounded to their living areas because they might not have other opportunities and have to live with floods. Students can be considered as a group with a high socio-economic status with (access to) the monetary sources to invest in their future by studying. Besides that, they can be considered highly mobile because of their ability to go from home to the University by having access to, or owning, transportation vehicles. The Unika students live in different parts of Semarang and are mobile in the way they can get to Unika by making their own commuting decisions. Despite the small scale of the study, it can provide some detailed insights and will perhaps inspire for further studies on the subject. This doesn't only has to be on the city of Semarang or Indonesia specifically but also other countries facing similar challenges. For the University of Unika the outcomes of this research might be of use as well. It can give some insight on the problems of its students and the challenges they might face to be able to follow their studies. This can be a reason to look for initiatives to make things easier for these students, maybe give them some alternative options to follow their study for example. For Unika students this research might help by giving an insight in the commuting decisions made by the students in this research. There could be possibilities for commuting that some might not have thought about before.

1.3 Research objective

This research focuses on a group of students at Unika living in flood prone areas. It is about their experience of floods and the decisions they make for commuting. It aims to contribute to the understanding of the influence of floods on commuting processes and decision making. This could contribute to the discussion about the climate change effects on people's livelihoods and the ways people deal with these. The goal of this research is;

To contribute to the understanding of the ways in which students are influenced by floods when trying to commute between their homes in flood-prone areas and Unika.

1.4 Research model

In order to know how the goal of this research can be reached it is important to know which knowledge and insights are needed. A research model schematically shows the logic of this research (Verschuren & Doorewaard, 2007, p.67). For this research it looks as follows:

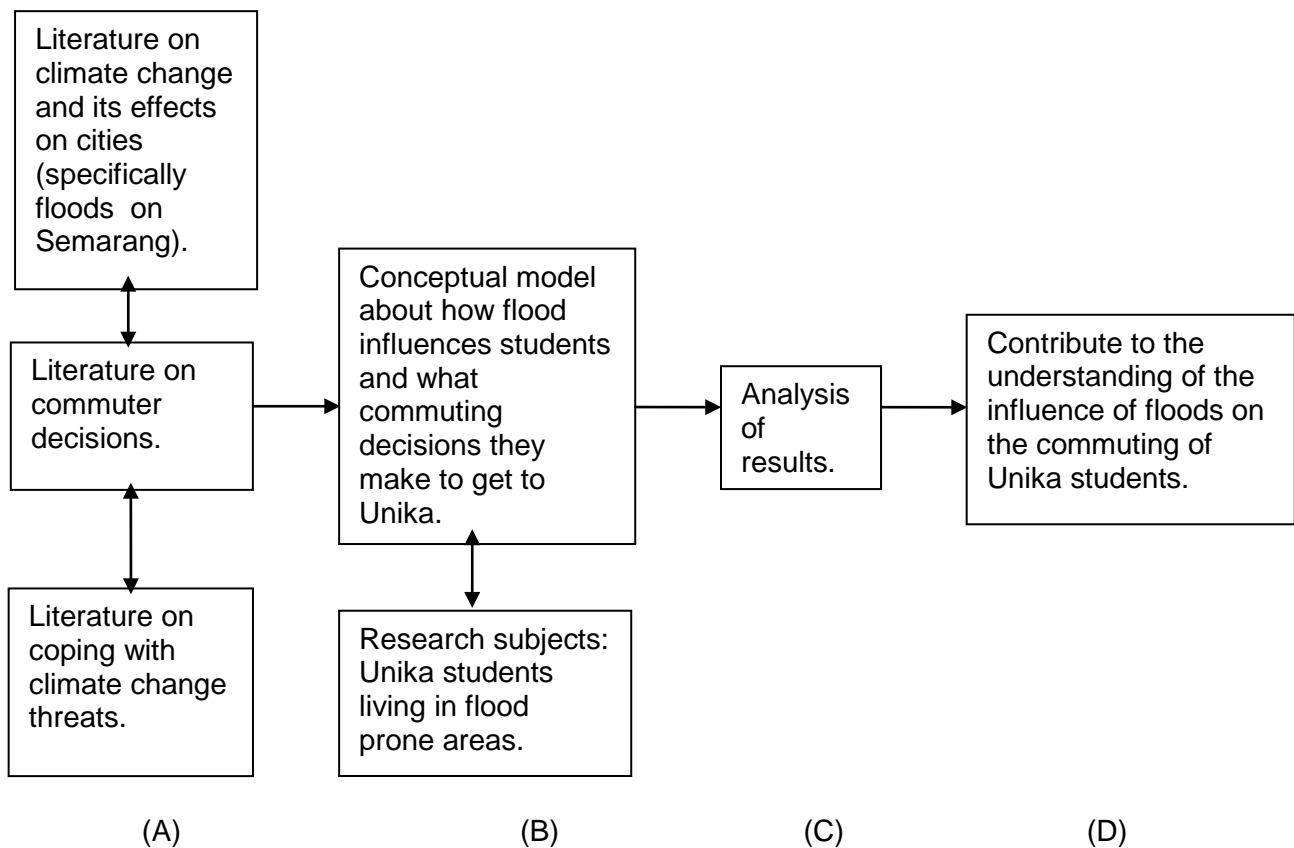


Figure 2: Research framework

There are four steps (A till D) with D being the goal of this research. The first step (A) includes the literature to be studied on climate change and floods impact on cities, specifically on South East Asian countries and the city of Semarang. By looking at studies on the discussion of the climate change effects on cities it provides context of the scope of the problem. Secondly literature on commuting decisions provides a conceptualisation for looking at the commuting processes of students. Third and last in the discussion on the influence of climate change on livelihoods there will be looked at the literature on coping responses. This way a conceptualisation could be made for the commuter decisions as ways of coping with floods. Both conceptualisations make up step (B) and give a hypothesis which will be used for the research on the Unika students, living in flood prone areas, to look at their commuting processes. Therefore a month of fieldwork was done in the city of Semarang and the campus of Unika. The methods for data gathering included interviewing the students and making observations of some of their living areas to provide context for the given answers. The results thereof will be analysed in step (C), using the theoretical concepts, which will lead to step (D); contribute to the understanding of the influence of floods on the commuting of Unika students living in flood prone areas.

1.5 Research question

From the research model and the research objective the knowledge needed for reaching this goal will be collected by the following research question:

How are Unika students, living in flood prone areas, influenced by floods in their commuting between home and Unika?

The case involves the Unika students with the characteristic of living in flood prone areas. The main question can be divided into sub questions by unravelling the key concept of this research (Verschuren & Doorewaard, 2010, p. 97). First is the way students experience floods in their living area. The first sub question will be;

How do Unika students experience floods in their flood prone living area?

The answering of this question provides some context for the ways students cope with floods, i.e. what commuting decisions they make, by finding out more about their experiences with floods. How problematic are the conditions (without trying to give an exhaustive image of this experience)? The experiences students have with floods is expected to influence their decision making to deal with the effects of the floods on commuting. The second sub question will be;

What decisions do Unika students make for commuting between home and Unika during flood?

A student commuter makes decisions for every travel from home to the university. It is expected the floods affect these decisions and this sub question is about what these changes in decisions are. This includes decisions during and before the commuting between home to Unika.

Thesis outline

The next chapter provides a conceptualisation for looking at the influence of climate change on commuting. Chapter three focuses on the group of students from Unika, selected for this case study, and will describe the data gathering processes during the month of fieldwork in Semarang. Chapter four presents the first part of these results including the different living locations and the experience students have with the floods. In the fifth chapter the flood influence on the students commuting will be described in specific subjects to really tell the whole story as it focuses on the different aspects of their commuting processes. It shows what commuting decisions they make and how they cope with the floods using quotations from the interviews with the students. With the conceptualisation of commuting decisions presented in the next chapter the commuting decisions will be analysed in chapter six. The final chapter concludes students are mostly capable in coping with the floods in their commuting and discusses their living area and flood experience are determining factors in this. This is followed by a discussion on what this means for the understanding of climate change effects on commuting and how the decision to choose for students as a case relates

to this discussion. It closes with recommendations for future city planning by discussing the importance of infrastructural development.

2. Theory

2.1 Theoretical framework

This theoretical framework provides an understanding of the concept of commuting and shows how commuters make decisions. Second section delves into literature on climate change and its effects with a specific discussion on floods, which is the focus of this case study. The third section is about submitting a link between climate changes, with floods specifically, and its influence on commuting. Therefore there will be looked into the discussion of coping with climate change effects.

2.1.1 Commuting

Commuting exists because people that do not live on the location of their work/study place need to travel to it, which involves relatively long distances in developed countries (Artis et. al., 200, p. 1431). However because of the rapid urbanization of (South-East) Asian countries similar developments can be noticed here as well (El Sioufi, 2010, p. 1). *“Commuting has been an important issue for researchers since urban economics has existed as a discipline”* (Artis et. al., 2007, p. 1431). Nowadays the decisions people take every day regarding the way they commute to their workplace or full-time study are not just of scientific interest. For the development of cities it is of importance to understand commuting processes when making decisions for the development of infrastructure and transportation, building new houses and so on.

“If these decisions (city development) are taken without a deep knowledge of commuting patterns, they are likely to be inefficient” (Artis et. al., 2007, p. 1432).

In these times of trying to make cities sustainable for the future, it is vital to understand commuting patterns for efficient development of urban structure efficiently (Muniz & Galindo, 2005, p.1; El Sioufi, 2010, p. 1).

Commuting decisions

The students of Unika make decisions regarding their commuting between home and Unika every time they leave home. A commuter has to decide which choices, concerning all aspects of commuting, to make every time leaving from home to work/study. But also longer term decisions can be made, like deciding to move elsewhere. These choices can be categorized in different ways but the conceptualisation that will be used is part of the Commuter Choice program developed in the United States. This program was developed to solve or alleviate worksite problems (such as employer recruitment) and benefit the employees. It can help the employer to explore the possibilities to commute to work. The program uses four categories to show the key components of the commuter choice that will be applied here as well:

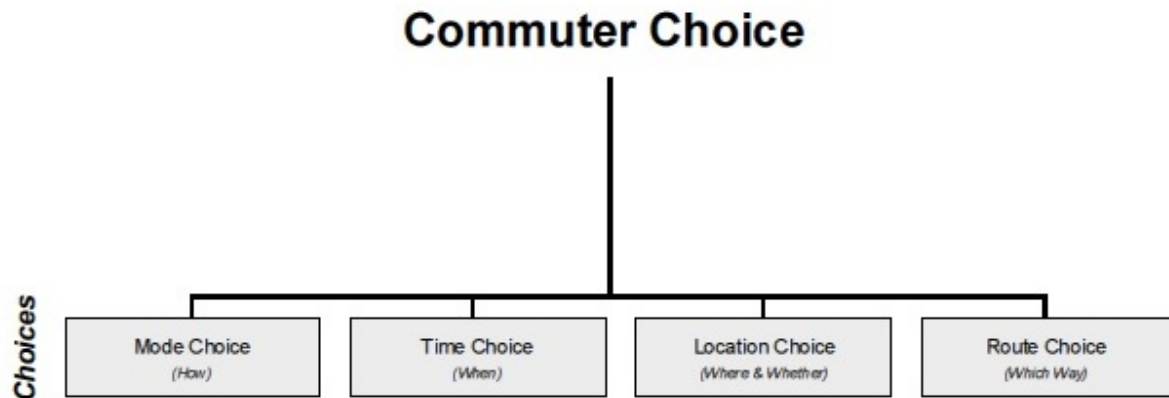


Figure 3: Commuter choices (part of original model)(Commuter Choice, n.d., p. 9)

All the choices interact with and influence each other as some examples below will show. The first and most common choice for any commuter is the mode choice and has probably been studied most extensively (Schwanen and Mokhtarian, 2005, p. 84). It refers to the way *how* commuters travel from home to the work/study location (Commuter's choice, n.d., p. 15). This includes the type of transportation vehicle, such as car, motorcycle, public transport etc., but also the travel company like travelling with someone else (carpooling for example). The utility of the mode is a determining factor for the choice a commuter makes, especially if the commuter is seen as a rational consumer. Objective price, level of service factors, travel time, travel cost and also variable taste are functions of utility (Schwanen and Mokhtarian, 2005, p. 84). Unika students can travel with fellow students or friends in/with the same transportation vehicle or use multiple transportation vehicles. This can obviously differ each time a student decides to travel to Unika and different modes can be used from day to day. Deciding to use a certain transportation vehicle can mean having to deal with possibilities/limitations of one over the other, like comfort level, costs for gas, the accessibility to a route, maintenance costs etc.. Besides the features of the transportation vehicle, other influential factors of the decision making can be parking possibilities at destination and its costs (Commuter's choice, n.d., p. 10).

The choice of time is *when* a commuter decides to leave home (Commuter's choice, n.d., p. 10). It is assumed a commuter has a preferred time of arrival (PAT) and experiences actual arrival time (AT) which can differ from the PAT (Jou & Kitamura, 2002, p. 2). When using the same route, or having experience with a certain route, a commuter is assumed to make the same decision in departure time as long as the schedule delay is acceptable (Jou & Kitamura, 2002, p. 1-2). If this difference is found to be unacceptable the commuter adjusts the time of departure (Jou & Kitamura, 2002, p. 2). The choice of departure time can also be influenced by the mode of transportation. Different transportation vehicles, deciding to travel alone or pick someone up along the way can cause the journey to take shorter/longer. Traffic situations on different routes or traffic systems can also cause the commuter to choose to depart home on a different time (Mannering & Hamed, 1989, p. 100). If a commuter has an option for shifting the time of the activities (for example a student starting study activities later

and ending these later) it can be a reason to delay or reschedule the departure time (Mannering & Hamed, 1989, p. 101).

The location choice consists of the decision ‘*where*’ to work and whether to commute or not, but also ‘*from where*’ to commute. It can be relevant when a commuter has different possibilities/alternatives to go to different work/study locations and can decide to change their work or study location for reasons like avoiding stressful commutes. The location options can be divided into two groups; home options and worksite options (Commuter’s choice, n.d., p. 29). In this study Unika can be considered as the workplace for students or they can decide to stay at home or other location to study.

The route choice can be seen as the result of experience, necessity and current information (Commuter’s choice, n.d., p. 11). The needs of a commuter can determine the route, for example when there are multiple things, like groceries, that need to be done along the way between home and work/study location. This can also be seen as activity opportunities including shopping, recreational activities or social relationships which can be combined with the commuting trip (Mannering and Hamed, 1989, p. 100). The experience of chosen routes can tell a commuter which route is more efficient and which takes longer or is more difficult. Information about different routes influence the decision making, like traffic jams or in this case rising water levels caused by floods. This information can come from media sources or people like friends or family. For receiving this information a student can use their cell phone, computer, television etc. or simply come from a conversation (Commuter’s choice, n.d.). The decision for the route does not necessarily have to be final from the moment a commuter leaves the house. Along the way new decisions like choosing different roads, lanes etc. can be made. Reference points, which come from experience with routes, are influential for making these adjustments (Senbil & Kitamura, 2005, p. 376). Additional costs for using a certain route in the form of toll can influence the choice of route as well. This applies for those students who decide to use the highway to commute to Unika.

2.1.2 Climate change

“The climate change phenomenon is making the issue of sustainable urbanization a matter of urgency.” (*El Sioufi, 2010, p.2*).

The rising awareness of climate change can be noticed all over the world and is now seen as one of the most pressing threats on this planet. Urbanisation and climate change have gone hand in hand for the past decades (*El Sioufi, 2010, p. 2*). Cities do not only generate the problem however but can also be vulnerable for its threats. Climate change can cause disasters and extreme weathers events but also more gradually increasing problems. These include rising temperatures, rising sea levels, more intense rainfall, droughts, heat waves and floods (*Jabareen, 2013, p. 220; Shamar and Tomar, 2010, p.452*). It is in cities where the solutions can and have to be made to combat the threats of climate change (*El Sioufi, 2010, p. 11*). Therefore there needs to be an interaction between the urban planning and climate change to be able to manage the challenges (*Brown, Dayal and Rumbaitis Del Rio, 2012, p. 532*).

Especially cities in developing countries are urbanizing fast and despite the fact they only generate minimal global greenhouse gas emissions, they are the ones most at risk (El Sioufi, 2010, p. 7). Coastal city areas are most exposed to the effects of climate change. They are highly dynamic and geo-morphologically complex systems, therefore very responsive in different ways to natural disasters, especially to rising sea water levels and severe weather risk (Balica, Wright & Van der Meulen, 2012, p. 73). Human settlements are threatened in these coastal areas and the livelihoods of people living in low-lying areas are at stake. The exposure of these populations and city assets to coastal flooding is predicted to increase, especially in East and South Asian developing cities (World Bank/International Bank for Reconstruction and Development, 2010, p. 11).

Sixty percent of the expected urbanization in the world until 2050 will take place in Asia. Right now about 54 percent of the total urban residents live in low lying coastal areas. The most vulnerable countries for climate change are not the biggest and their extreme growth is just beginning. Half of these urbanizing cities in Asia have less than 500.000 residents and will undergo extensive developments (Brown, Dayal and Rumbaitis Del Rio, 2012, p. 532). By 2025 Asia will have 332 urban agglomerations and the rest of the world 267 million. The rate of urbanisation in Indonesia is 80 percent, the highest in the world along with China (Kumar, 2013, p. 1457).

Extensive research has been done on the effects of climate change on cities all around the world and in South East Asian cities specifically but also on the livelihoods of its residents. It is often concluded these livelihoods are threatened (Worldbank, 2013). While climate change threats call for effective national and city policy's, the support for local livelihoods is still lacking and the responsibility for the protection of these livelihoods often lies with the residents themselves.

"Both now and over the long run, climate change and variability threaten human and social development by restricting the fulfilment of human potential and disempowering people and communities, constraining their ability to protect and enrich their livelihoods." - (Worldbank/ International Bank for Reconstruction and Development, 2010, p. 1)

In Indonesia climate change is especially noticed by the rising amounts and severity of floods, which is one of the worst natural hazards this country has to deal with (Dewi, 2007, p. 1). The city of Semarang, Central-Java, is one of the city's that notices the effects of climate change by the increasing amount and severity of floods. This study focuses on the flood situations in Semarang as a suitable case for looking at the effects climate change can have on city residents. The current situation of the floods in Semarang has already been briefly discussed in the introduction, but what are floods? Dewi (2007, p. 11) mentions that defining floods is difficult because of its complexity and the different understandings people have of it. For the case of Semarang floods can be defined by its causes as has been discussed in the introduction as well; local flood inundation (mainly caused by rainfall), river flood and tidal flood (Dewi, 2007, p. 11)(Harwitasari & Van Ast, 2011, p. 3). Harwitasari & Van Ast (2011, p. 3) describe the types of floods; Local flooding and river flood occur during the rainy season on the lower part of the catchments, when the rainfall in the catchment area exceeds the capacity of stream channel and drainage ditches. Tidal flood occurs when the sea level rises to a critical height above the coastal lands due to tidal elevation. Tidal floods occur daily, depending on the tidal oscillation combined with the drainage system.

Cities in Indonesia are even more vulnerable because of the inequity and informality within them. In previous years there has been released multiple studies on the ways people try to protect their livelihoods in Semarang dealing with the floods (including but not limited to Dewi (2007), Harwitasari (2009), Marfai et. al. (2008) and Harwitasari & Van Ast (2009), included in the literature list) (Kumar, 2013, p. 1461). These studies interfered in the discussion on the influence of climate change, floods specifically, and the coping (Dewi (2007)) or adaptive responses (Harwitasari (2009), Harwitasari & Van Ast (2011), Marfai. et. al. (2008)). However none of these studies focused specifically, or only mentioned it briefly, on the effects of floods on commuting. The ability to commute and be mobile however is an important asset for sustainable livelihoods and deserves attention (Bryseon et. al., 2003, p. 46). Commuting can be a threatened aspect of people's livelihoods as well seen the severe problems caused by floods to it. Semarang struggles with inefficiency of its infrastructure and the floods cause damage to roads, especially in suburban areas of which some are prone to floods (Merdeka, 2012). One of the five points on which Semarang's resilience strategy for climate change is the development of infrastructure as it is acknowledgements as one of the major challenges. However right now the problems with infrastructure partly caused by floods are comprehensive and insights are needed in the way commuters are affected by this.

2.1.3 Climate change and commuting

This research tries to get a better understanding of the influence of climate change on commuting by taking the floods in Semarang as a case. As discussed before there have been studies on the coping or adaptation responses of people living in flood prone areas to secure their livelihoods. These showed what strategies people, communities and governments apply in order to deal with the threats of floods. These studies primarily focussed on the protective strategies applied for the protection of houses. They did not specifically look at the commuting processes or at least did not give a sufficiently comprehensive image of this. The effects of floods on travelling or commuting got limited attention, especially what problems people face specifically when trying to commute. This study focuses on coping behaviour and decisions made in relation to commuting in order to get a more comprehensive understanding of the influence of floods on commuting (with the Unika students living in Semarang as the case).

First an understanding of coping is needed. The term coping can be defined and used in different ways but a general definition used here is;

"Ways of coping are the basic categories used to classify how people cope" (Skinner et. al. (2003, p. 216).

Coping can be seen as a successful adaptation (Lazarus & Folkman, 1984, p. 140). This applies in this research because the focus is on the commuters who still travel to work and are apparently successful in doing so by coping with the flood effects. A person's successful adaptation to a stressor is the coping outcome. This is accomplished by appraising the situation and the resources and is influenced by a coping effort or efforts (Glanz et. al., 2008, p. 219). Appraising the situation would in this case be the situation of the floods and its

effects on the commuting possibilities. Appraising the resources could be different things for the commuters of Semarang like the transportation vehicles.

Dewi (2007, p. 45) makes a distinction of coping, or coping mechanisms specifically, in different stages; before flooding, during flooding and after flooding. Sort of the same idea will be applied here but in this case two stages will be distinct; proactive, taking action before an event occurs and reactive, taking actions when the events are occurring. These distinctions are used by Harwitasari & Van Ast (2011) in their research about '*Climate change adaptation in practice: people's responses to tidal flooding in Semarang*'. The adaptive responses or adaptations in this research are also about the ways people take action in order to cope with the floods. The link between coping and adapting was already mentioned above; coping can be seen as a successful adaptation.

Before proactive and reactive will be explained any further it's important to know what adaptation (responses) are, in order to understand it's distinction of the time people make them. Adaptation responses to natural hazards and climate changes can be seen in different countries all over the world. Especially in low and middle income countries the reduction of the vulnerability of climate changes is an important challenge (Harwitasari, 2009, p. 1). The floods in Semarang, especially in the coastal region, are partly caused by climate changes affecting the tide of the sea (Harwitasari, 2009, p. 3). In Yuen et. al (2012, p.1) a definition of adaptations is presented in the context of responses to climate change; "*adaptation refers to the actual initiatives and measures to reduce the vulnerability of systems against actual or expected climate change effect.*" Here we can see time is an important aspect in adaptations. Adaptations can be made for current risk events or in advance for the risks expected. This brings us to the first possible differentiation of adaptations; reactive and proactive adaptations. Reactive adaptations can be made for the events that are occurring at that moment. Proactive adaptations are taken before an event to reduce its negative impacts and risks involved (Harwitasari & Van Ast, 2011, p. 2).

But how can coping apply in the context of commuting and floods? In general people make decisions in dealing or coping with the effects of the flood (Dewi, 2007, p. 68). The commuting decisions framework presented in the beginning of this chapter will function as a conceptualisation to look at the ways the students cope with the floods in their commuting processes. In order to make this model more complete and applicable there will also be focussed on the way students enable themselves to make these decisions. This means looking at their proactive and reactive decisions and what kind of long term decisions they make to be able to commute instead of only looking at their day to day decisions.

2.2 Conceptual model

The categorization of commuting decisions in the context of floods can be conceptualised by using a model in which the relations between floods and commuting decisions will be shown. Figure 4 shows how the students living in areas prone to certain flood conditions (which can differ from person to person) have certain experiences with the effects. This experience is a determining factor in the decisions they make relating the commuting between their home and Unika.

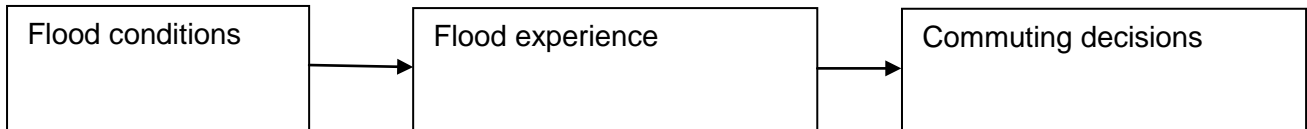


Figure 4: Conceptual model floods and commuting

The decisions a student makes for their commuting can be extensive and will be structured by using the categorisations presented in the theoretical framework below. These categorizations include all aspects of the commuting process itself. There will also be looked at the decisions students make before they make a certain commuting decision. Also since commuting decisions are used as a way of coping with the floods there will be looked if these decisions are made proactively or reactively.

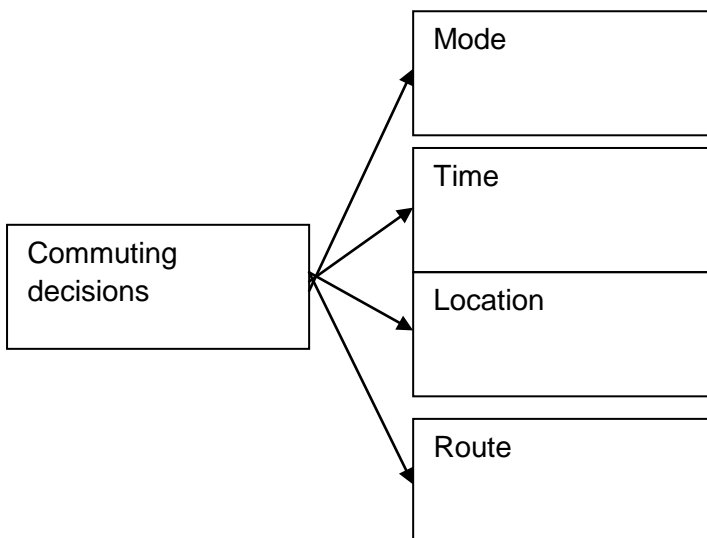


Figure 5: Commuting decisions

3. Methodology

This chapter discusses the methodological framework for this research, explaining which methods were used to collect the data and how this is analysed. First the choice for a case study as a research strategy will be explained, followed by the used methods for collecting data including an explanation of the guide used for the interviews during the fieldwork. The process of the interviews with the Unika students will be elaborated by describing the selection of the interviewees and the process of the interviews. Next to interviews the fieldwork allowed for some observations as will be described as well. The last section explains the methods for the analysis of the collected data.

3.1 Research strategy

The focus of this research is on the influence of floods on commuting behaviour of those living in flood prone areas. Therefore it focuses on the highly mobile group of students to understand what challenges they face and what decisions they make for commuting when dealing with floods. Students from Unika have been selected for this case. Unika is one of many Universities in Semarang but the reason for choosing Unika is simply because the Radboud University, or more specifically the supervisors of our research group, has connections with this university. This way we got the ability to use the facilities of Unika and meet the students. These students come from different parts of Semarang or other areas including those who get flooded sometimes. The focus of this research is on students experiencing floods in their living areas and their travelling experience from home to the University during floods and not so much on the location of the University. Therefore there was not much reason to question Unika as the case. Because of the limited means and time 'in the field' for this research it probably would not be possible to include other Universities anyway. The group of students was relatively small but did allow for a more detailed approach by spending the limited time on their stories only. This allowed for some interesting results despite the small amount of research units (Verschuren & Doorewaard, 2010, p. 191).

With the possibility of doing the fieldwork in Semarang there was the opportunity to make observations of the living areas of some of the students. By visiting their houses and be in their 'natural environments' there could be seen in what conditions they lived (Verschuren & Doorewaard, 2010, p.185). This was done by starting at Unika to drive to those locations and using some of their travelling routes. By doing so it made some of the things the students mentioned a lot clearer. During the fieldwork there was the possibility to use the facilities of Unika as well and being there showed which transportation vehicles Unika students use and if they travel with company.

3.2 Research methods

In order to answer the sub questions, and therefore answering the main question, the selection of the data gathering methods will be discussed in this section. First here are the sub questions again;

How do Unika students experience floods in their flood prone living area?

What decisions do the students of Unika make for commuting between home and Unika during flood?

For each of these sub questions the same research methods apply; interviews with the students and observations of the students, situations and surroundings of flood prone areas. The next parts explain how these methods were used and for what information. Both for the observations and the interviews I worked together with my colleague student Tom. Although his research was on a different subject we both had to make observations of the student's houses. As will be discussed later in this chapter it was useful to work together during the interviews with one of us writing down notes while the other was asking questions. In the following sections 'we' refers to Tom and myself.

3.2.1 Interviews

The most important information comes from interviews with the students living in flood prone areas. The interviews were semi-structured to make sure all the aspects of the main question were covered while allowing room for contemplated answers as well. Before asking the content questions it was needed to make sure the interviewee had certain characteristics. Most importantly they needed to study at Unika and went there on a regular basis and lived in a flood prone area. When it was clear the interviewee could be interviewed for the right information he or she was asked about their experience with the floods in their flood prone living area. Next part was about their commuting decisions and how these changed because or during periods of flood. The interview process will be described in detail in the next section. The interview guide is included in appendix 1.

Before going to Indonesia it was already clear that it would be possible there was going to be a language barrier and that not everybody might speak English well enough to understand and explain everything needed. Therefore someone needed to be found willing to help as an interpreter during the interviews. Eventually this appeared to be no problem at all and we got all the help we needed with this from a couple of Unika students we got to know in the first week of fieldwork.

Selecting the interviewees

When the decision was made to interview the students of Unika it was obvious to look for a way to get in contact with students living in flood prone areas. Mr. Donardono helped us by letting us meet Cathy, a student at the law faculty, from which he knew she lived in such an area. From there on it was like a 'snowball effect', as Mr. Donardono suggested or predicted

as an option for finding more students for interviewing. We made an appointment for an interview with Cathy during our first meeting with her and asked her if she knew any other students living in flooded areas. The snow-ball effect can be useful when it is difficult to find willing participants (Boeije, 2008, p.53). When random selection approaches are limited in their effect at revealing relevant respondents due to their being limited in numbers, as compared to a larger population they are part of or if issues discussed before are delicate then the snowball-effect can be of use. In the beginning this seemed like it could be a problem since some students seemed a little reticent or shy at first. By letting students like Cathy approach fellow students it seemed like they were more comfortable with us asking them questions. Another advantage of this selection method is that after each interview it became clearer to us and the interviewed students for which students we were looking for in the next interview (Verschuren & Doorewaard, 2010, p. 186). Mostly this came down to selecting students who experienced floods frequently. Also for some students who would help by asking other students if they wanted to be interviewed as well it could get clearer for whom we were looking for.

For the first interview Cathy suggested to show us her house. By the time we met her again at Unika, where she would pick us up, three friends of her came along as well. She asked these three students (Ruth, Naomi and Melissa) to join for an interview as they live in flooded areas as well. At the end of that day we got four interviews with students living in different areas of Semarang which we got to see during that day. Mr. Donardonono also helped us by taking us to the administration office of Unika to ask for a list of students who live in areas where floods occur. Provided with a list of a large amount of the Unika students, categorized by their living areas with their telephone numbers, we could ask them for interviews as well. However we did not contact any of these students since we got the sixteen other interviews with the help of some Unika students. We ended up collecting twenty interviews with students at Unika living in different parts of Semarang. This way we got interviews with students with different flood experiences and travelling from different places to Unika.

Since not all students at Unika spoke English well enough to interview them on their own, we needed to think about a way to be able to interview them anyway. For our first four interviews this appeared to be no problem at all. Cathy and Ruth spoke English well enough to help translating our questions for Naomi and Melissa, who sometimes had a hard time understanding us and explaining themselves. This led to some conversations in Indonesian we did not understand but Cathy and Ruth translated the answers back to English. For most of the other sixteen interviews we got help from Unika student Mona and her friends.

Conducting the interviews and observing

The interview guide was set-up in a way it gave some structure and was applicable for all interviews. As said before it was still a guide and I did not necessarily use it as a list of questions which all had to be answered or used in the same way, also giving freedom to the respondents to tell their own story. The interview guide can be seen as semi-structured. Student colleague Tom and I decided to combine our questions by creating two sections in the same interview, first my part and second his. Before these two sections we started with some introduction questions. These would be relevant for the both of us and not specifically

for on or the other research. We worked together on creating these questions so we would both know everything we wanted to be included was on there. This way we got some background information of the respondent that provided us with some context for the questions to come. In this introduction we asked the students about their flood experience and in what area of Semarang they lived. Most of the time I asked the questions and Tom would write notes and asked some additional questions when he found necessary.

After the introduction the first question was about the choice of transportation i.e. what transportation vehicle was used for travelling to Unika and if they travelled on their own or with someone else. Most interviewees understood this question without needing much help with the translation from the students who helped us with narrating and the term transportation vehicle appeared to be a good choice during the first interviews. As a follow up question the students were asked if and what problems they experienced during floods when travelling to Unika and if they still chose to go there during these events or stayed at home instead. This time most needed some help with the translation and often there were some pretty long conversation between the narrator and the interviewee. To our surprise our narrator gave some pretty brief answers so it appeared it took some time to make the questions clear for the interviewee before they told their answer. Most of time, especially after having some practice with the first interviews, it seemed like there might be some more problems they experienced than they initially answered after making asking the question. After doing some interviews I heard some answers that are quite common, like problems with the vehicle or with traffic. When this was not directly mentioned as an answer I asked if they experienced these and different problems as well. Sometimes the answer was simple and short, sometimes they told quite a long story to explain in detail what happens when they travel to Unika during flood. By asking more specifically about their problems and did not move on to quickly to the next question was a needed and fruitful choice to get more out of the interview.

The following question involved the students' decisions to possibly travel with a different transportation vehicle to Unika during flood. What were their reasons for doing so? During the first interviews this seemed to be a useful question as a large part of the interviewees did choose to take a different transportation vehicle sometimes because of a flood. This question was answered pretty quickly as a lot of respondents understood the question without much explaining or translating. After this they were asked if they travelled alone or with someone else and if that changed because of the flood (travel with someone else during a flood instead of alone as usual for example). For both of the previous questions I asked if they prepare for a possible change in travelling vehicle/company (instead of reactively making this decision) and in the route they take.

The next section included a question about possible additional costs for travelling during flood. Like with the previous question about the possible experienced problems it became clear I needed to use some examples from previous interviews to check if there are any more costs than the respondents initially mentioned. Some times after asking the question as was stated in the interview guide I even got some answers (mostly by the narrator since help was needed to make it clear) about no extra costs at all. But when I asked about possible repair costs for their vehicles or gas for example it appeared they did not seem to think about it first but was in fact the case as well. When I thought all possible costs were mentioned I asked if they prepare for these costs by saving money for it.

The last set of questions was about the possible changes in residence during floods. This could be moving to a different house owned by family or friends or other possibilities. In the second interview for example, the interviewee did once move to a hotel temporarily. Since I did not want to exclude any possibilities I did not limit myself to just ask if they lived with relatives or friends. This question did not need much explanation and most answers were short and clear. Follow up question, if someone did move, was about the reason why. Last I wanted to know if this possible change was prepared for or if it was decided when flooding events already occurred.

3.2.2 Observations

Besides asking the students about their ways of coping through interviews, observations also gave new insights and put the things students had to say into context. This included observations of traffic scenes, roads, seeing the neighbourhoods and houses of students and the Unika campus. Not only did this provide background information of some parts of Semarang's flood prone areas, it also made secondary data about the area clearer. Furthermore it served as comparative material for other sources of information like the interviews with the students. If interviews were the only source of information some things wouldn't have been as clear. The opportunity to see how the student's lived was of great value for the research and provided some photographs that are used in the following chapters.

3.3 Analyzing and representing the data

All the collected data needed to be processed and analysed in order to know what these sources of information tell. Different research approaches ask for different ways of analysing the collected data. Analysing in qualitative research can be defined as;

'The process of systematically searching and arranging the interview transcripts, fieldnotes, and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to other. Analysis involves working with data, organizing them , breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others' (Boeije, 2008, p. 62).

Since this research is conducted as a case study I chose to use the analysing process fitted for this approach. Besides analysing, the way of representing the data is also dependent on the approach. Both aspects will be discussed. Creswell (2012, p. 199) describes four steps/ways of interpreting and analysing. The first step includes categorical aggregation in which multiple aspects of the data will be searched for at the same time. This includes the commuting decisions made by students and the proactive or reactive types of each of these. The next step is direct interpretation for which the researcher looks at only one aspect or in this case categories of commuting decisions. Next there can be searched for patterns by looking for connections between categories. When this is done it should be possible to make naturalistic generalizations that can be used by others for themselves or research purposes and will be shown in the conclusion. The analysed data will be presented by creating an "in-

depth picture of the case (or cases) using narrative, tables and figures” (Creswell, 2007, p. 191).

Reflecting the methods

Before the fieldwork in Semarang started the decision was made to research the phenomenon of climate change threats effects on commuting. Therefore the students living in flood prone areas were selected as the case. However this was only determined when already arrived in Semarang. The first intention was to select a certain flood prone neighbourhood and selecting some residents for interviews. Instead now there was chosen for a different approach; selecting the students living in different places but commuting to the same location; Unika. This way it was possible, despite the limited number of interviewees in this case, to interview people with different flood experiences instead. Some lived in more flood prone areas than others. This resulted in an understanding of the relation of the impact of flood experience on commuting. Secondly the characteristics of the students (highly mobile, high socio-economic status and other like discussed before) allowed getting an understanding of the severity of the problems as these students are expected having a relatively high coping capability. Combining interviews and actually doing observations on location proved to be valuable for getting a more complete understanding of their commuting behaviour. The selection of the interviewees was mostly done with the help of some of the Unika students we met in the beginning of the week. This turned out to be a useful selection of students with comprehensive experiences with floods in their commuting processes.

4. Experiencing floods

This chapter involves the background information about the students in order to get a context of their living situations before looking at their commuting decisions and experiences. The first section includes details about their living location, the second section discusses their general experiences with flood in and/or around the house and their neighbourhood.

4.1 Living areas

The students at the University of Unika live in different parts of Semarang. It is quite common for students to keep living at home with their family instead of moving to Unika, or a location near there, on their own. The twenty students who were selected for the interviews also live in different area. However they needed to live in flood prone areas in order for their insights to be relevant for this research. This means they had different experiences with floods because the flood conditions were different between, but also within each area. The map (figure 6) below shows the areas of Semarang vulnerable for tidal flooding coloured blue. The students did mostly live in the red coloured areas which explains why most students do not have to deal with tidal floods. The exact living locations of the students are shown in table 1 with the names of the neighbourhoods. Figure 7 shows the location of Unika on the map by the black arrow and the living areas of the students. The living areas in table 1 are numbered corresponding with the numbers in figure 7. This figure also shows which areas are prone to floods (see legend).

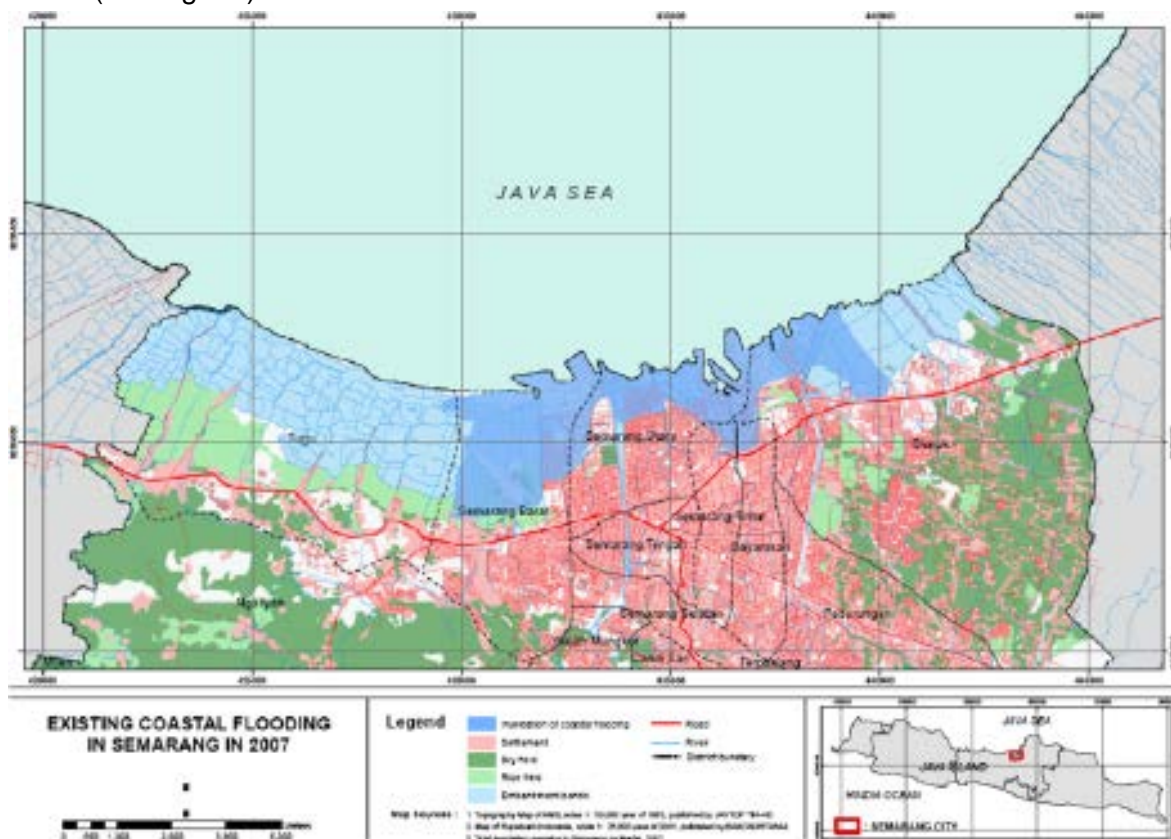


Figure 6: Coastal flood prone areas (Harwitasari & Van Ast, 2011, p. 3)

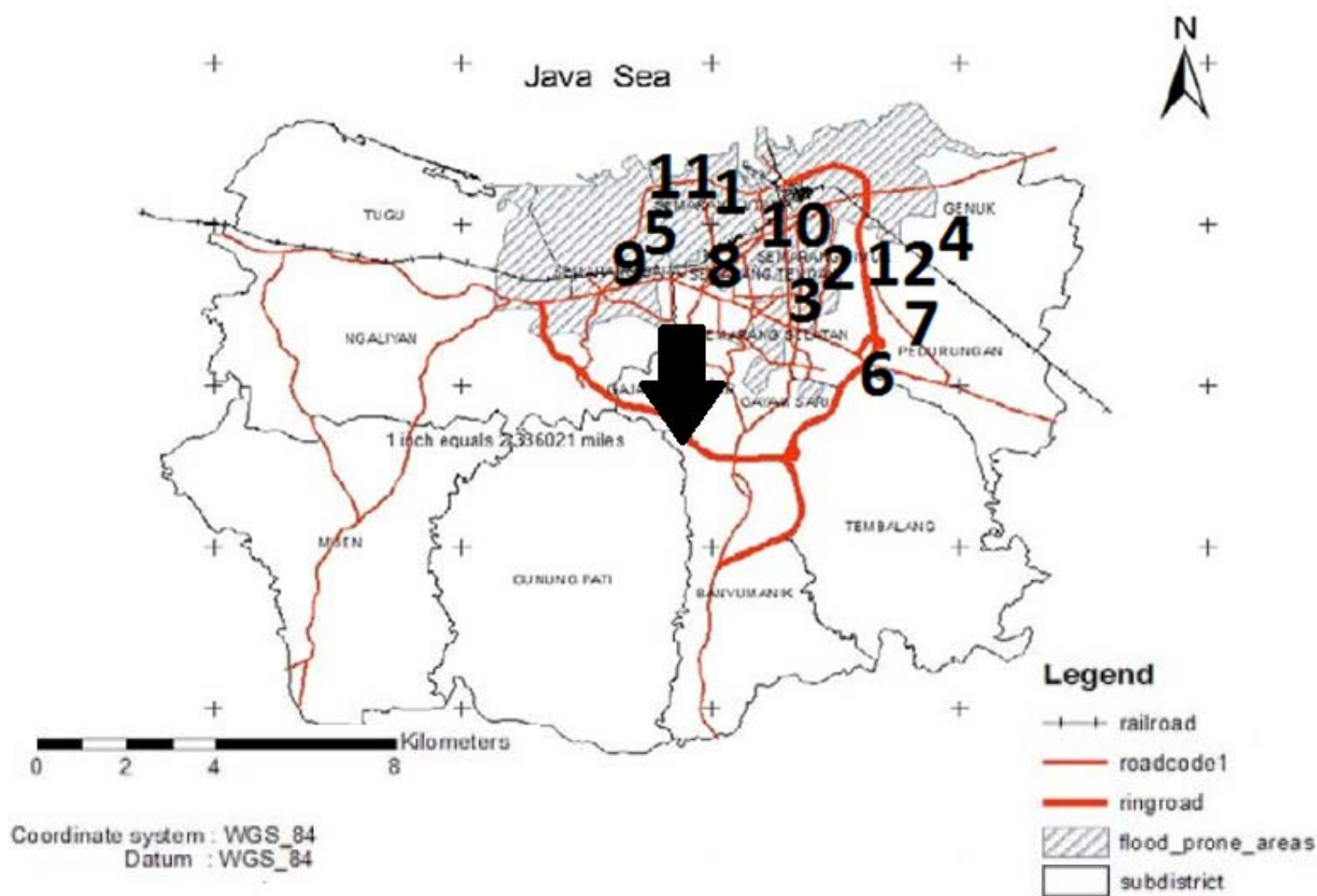


Figure 7: Location living areas (Source: Dewi, 2007)

Name respondent	Living area/ neighbourhood
Edo	Alamat Jl. Muara Mas (1)
April	Citarum (2)
Ayu	Citarum (2)
Melissa	Citarum (2)
Yosua	Citarum (2)
Shenny	Depok (3)
Marcus Eric	Genuk (4)
Firda	Indah (5)
Margareta	Majapahit (6)
Tania	Pedurungan (7)
Natalia	Pemuda (8)
Indra	Pun Anjasgoro (9)
Cathy	Puri Anjasgoro (9)
Ruth	Raden Patah (10)
Fransiscus	Tanah Mas (11)
Marwanto	Tanah Mas (11)
Monica	Tanah Mas (11)
Oktavia	Tanah Mas (Utara) (11)
Naomi	Tlogosari (12)
Wilhelmus	Tlogosari (12)

Table 1: Living areas/ neighbourhoods students

4.2. Flood experience

Semarang faces three types of floods which differ between flood prone areas. As described before these include floods caused by the high tide from the sea, overflowing rivers or due to heavy rainfall (Harwitasari & Van Ast, 2011, p. 3). The students from Unika have different experiences with the floods as they live in different areas. Most of them however experienced floods caused by heavy rainfall and some said the floods get worse every year. Only four students also experienced tidal floods but all of them told the heavy rainfall has more effect on the water conditions. Monica told the tidal floods are not very problematic for her and Indra had a similar experience; *"Rob also happen, but not very bad."* Naomi and Melissa experienced tidal floods in the streets near their houses but it didn't actually come into their houses; *"There is tidal flood on the main road (Naomi)". "Only on the road that we pass earlier (Melissa)."*

The students often mentioned that the floods are more severe during the rainy season as it is during those months rain fall occurs more frequently and more severe. Like others, Naomi stated the frequency of the floods *"depend on the rainfall"* and Cathy told *"the most time the flood comes is in rainy season"*. For April there is a strong relationship between rain and floods and for Wilhelmus rainfall automatically means floods.

"Every time there is only a little rain it can cause a flood. If it rains every day, the flood is every day." (April)

Not all students mentioned the rainy season though but gave more of an indication about the frequency of the floods on a monthly basis. This varied quite a lot, some told about several times a month while for others this was only once a month or even only a couple times a year. Floods caused by rainfall are very unpredictable for most students because it is hard to tell when it will start raining exactly. Some said the weather forecast provides them with some information but more often than not it is a *"surprise"* (Fransiscus) every time the rain starts and cause a flood. Not knowing when a flood starts can cause problems like for Natalia; *"she and her family are unprepared to save the stuff"* (Mona). However when the rain starts it takes some time before it leads to a flood. The rain can predict the floods up till a few hours in advance. As soon as it starts raining heavily Marcus Eric takes action and sometimes moves to his cousin to avoid the flood.

The duration varied a lot as well between the interviewees, it could take a few hours for some while it took days for others. Also because the floods are not the same every time they occur in a particular area makes it even harder to give an indication of these timeframes. The same applies for the time it starts and the time it ends. Most of the students experienced floods for an average of about a day, nobody longer than 3 days. There did seem to be a pattern though in the way a lot of floods started in the afternoon or in the beginning of the evening. In some cases these last until the morning after like with Farda; *"It usually happens in the evening and then the next day, it is gone"*, but there are a lot of other examples as well. Cathe's experience of the floods is that; *"In the morning it is the worst"*.

Students had different experiences with the floods as far as the water entered their house or only flooded the streets. Like for most the floods also come into Ruth house;

"I also experience heavy flood in my room and in my bedroom and in every sector of my house."
(Ruth)

An important factor for this difference is if a home is high enough, so the water level does not reach the level of the house and enter it. Figure 8 shows the effect floods can have if houses are vulnerable to floods because they are not elevated.



Figure 8: Flooded houses

House owners in flood prone areas often need to take measures into their own hands by elevating their houses. If they do not they have to face the consequences of their house getting flooded. Some people decide to leave their house behind like the house on the second picture as told by Melissa when visiting her house in the same street. When we got invited to her house some men were busy with constructing the elevation of the house. Later it became clear how necessary this was when Cathy told about Melissa; *"it comes into her house, up to twenty centimetres."* Cathy's house was already elevated like other houses in her neighbourhood which is also why she does not experience water getting into her house. Figure 9 shows how Cathy's drive goes up from the street to the level of her house, on the right a similar sight from one of her neighbours.



Figure 9: Elevated houses

When people take these measures it can cause a problem for other people living near in the neighbourhood. Wilhelmus experiences such a problem because near his house *“there is new building...the water gets of the land because of the building...drainage problems.”* This can even get worse when whole streets are getting elevated as some students told and became clear during observation. The left picture in figure 10 taken near Cathy’s house shows how streets near houses get elevated which puts these houses in a vulnerable position for floods. The right picture shows a common scenario which happens in different areas of Semarang whereby main streets get elevated while the side streets, in this case the one where Melissa lives, do not. This works as a catalyst for the impact of the floods for the low lying areas.



Figure 10: Elevated streets



Some sort of protection can be found in the form of small canals along the sides of the streets which should help with the drainage of excessive water (figure 11). These measures are not always enough though and the streets still get flooded from time to time.



Figure 11: Small canals for draining water



The flooding conditions can have an impact on students in their choice of keep doing their normal daily activities or decide to change their plans for the day. The vast majority stays at home, some not always but mostly they do, depending on the flood severity. Fransiscus does not always leave his house; *‘depends on the flood itself, when it’s really bad he stays in his house all day’*. For Ruth these conditions are so serious she told;

"I'm staying at home because the main road is also flooded so the access is not good." (Ruth)

Firda sometimes still does her daily activities; *"depends on the activity, when the activity is very important she goes outside but when it's not important she stays home until the flood is gone."* When there are floods in Shenny's neighborhood while she is somewhere else she does not go home.

Remarks

The text above does not capture the whole experience of the floods of all students who were interviewed. An attempt is made to tell the most common stories by using some answers as examples of an experience shared in sort of the same way by more students. If there were exceptions that told a different story worth mentioning than this was also added, to be as complete as possible on telling the student's stories. The goal of this section is to give some context for the next chapter in which the students commuting decisions and stories will be discussed.

5. Commuting from flood prone areas

This chapter discusses the Unika student's decisions and coping behaviour towards floods when travelling between home and Unika. This data was collected through the interviews with the twenty students during the fieldwork. The observations add additional information about the living areas of some of the students and put some of the answers from the interviews in perspective. Both will be used to tell the story of these students. Different aspects of the data will be discussed in separate sections, using tables for showing the answers given by students to the interview questions. These tables just show some of the information but do not tell the whole story. Therefore, if necessary, further explanations will be given using answers given by students.

5.1 Transportation vehicle and travelling company

The interviewed students live in flood prone areas which are not near the location of Unika. In order to commute between home and Unika walking would not seem an option and all students used a transportation vehicle. Before the first interview was done walking down the campus gave some hints already about types of transportation vehicles used by students. There are quite some parking spaces for cars but that was overshadowed by the amount of motorcycles stacked side by side. The table below shows the students either travelled with car or motorcycle. It shows they were no exception compared to other students in the way the motorcycle is used most.

Name respondent	Transportation vehicle and possible travel company	Different transportation vehicle and travel company during flood
Ruth	Motorcycle with brother.	No.
Cathy	Car.	No.
Melissa	Motorcycle.	Car (with Naomi and friends).
Naomi	Car (with friends) or motorcycle.	Only car.
Shenny	Motorcycle.	No.
Marcus Eric	Car.	No.
Tania	Motorcycle.	Car (with driver).
Oktavia	Motorcycle.	No.
Yosua	Motorcycle.	No.
Edo	Motorcycle or car.	Prefers motorcycle.
Marwanto	Motorcycle.	No (not possible to travel).
Fransiscus	Motorcycle.	No.
Natalia	Motorcycle.	No.
Margareta	Motorcycle with friend.	No.
April	Motorcycle.	No.
Ayu	Motorcycle, sometimes with friends.	No.
Wilhelmus	Motorcycle.	No.
Firda	Car alone or motorcycle with boyfriend.	Boyfriend picks up with motorcycle.
Monica	Car.	No.
Indra	Car alone or motorcycle with friends.	Preferably not with car.

Table 2: Transportation vehicles and travel company

A few students used a car only for their commuting between home and Unika. Most use a motorcycle and some use both. Not all students owned a car by themselves but were able to use one because they could use it from their parents. Owning a motorcycle seems very common seen the reply of some of the students when asked about the transportation vehicle; as it was obvious they used a motorcycle. This was not very surprising though since motorcycles are used by people from all ages, men and women. The streets of Semarang

are full with these driving around. Biggest part of the students travel on their own, both car and motorcycle users. For those who did not, the travel company existed of friends, relatives or a relationship partner. For Ruth it was necessary to travel with her brother as they had to share a motorcycle. For others it seemed more like a social thing to travel with friends or others.

Most of the students did not make any changes in their choice of transportation vehicle and/or travel company when commuting during floods. Some did not have any other transportation vehicle and had to force their vehicle through the floods, risking damage being done to it. Others did but there was no reason for making any changes as the flooding conditions were not that bad for them in relation to others. All of them still used a car or motorcycle but some preferred one over the other during floods. When *“there is flood I do not go with the car”* Indra told, while Edo prefers to use his motorcycle because it is high enough to prevent him from getting wet. For Melissa her friend Naomi picked her up by car during flood. Tania usually uses a motorcycle but during flood the family driver brings her to Unika.

5.2 Route

In flood prone areas the streets can get covered with water when a flood occurs. The severity differs from neighbourhood to neighbourhood. Some students had to find ways to cope with the problems this causes for their commuting between home and Unika by changing their route, while for most others there was not much reason to do so. This change in route was mostly for the conditions of the water level of the usual route, therefore different routes are chosen to avoid these conditions. Edo for example sometimes chooses a route with a higher street level. This could mean the alternative route was not flooded or the flood conditions were less severe. By taking an alternative route some students saved time even when these were longer. By doing so they also eliminated or reduced the risk for damage being done to their transportation vehicles. Changing routes for most students meant they take a longer route which could easily take up to an hour in travel time (compared to the usual time during non-flooding periods). For Monica it even took an additional two hours to get to Unika and for Firda up to an hour.

“I took the longer route to Unika and it takes a long time. Because I have to choose other route that does not get flood.”(Naomi)

Naomi, Tania, Edo and Monica (sometimes) choose to go by highway. Naomi uses both motorcycle or car but when she decides to go by highway during flood she only uses her car, as do the other three students as well. Tania normally takes her motorcycle on her usual route to Unika and only goes by car on the highway with her driver. Though Edo prefers to use his motorcycle during flood, he does use his car to go by highway because of high water. For Marwanto there were no possibilities to choose a different route, the high water conditions around his house are too worse for him to even be able to leave home.

Name respondent	Changes in route during floods
Ruth	No.
Cathy	Other route (without floods).
Melissa	No.
Naomi	Highway, only when using car.
Shenny	No.
Marcus Eric	Different route (longer).
Tania	Highway when flooded.
Oktavia	No.
Yosua	No.
Edo	Higher route when using motorcycle, Highway when using car.
Marwanto	Not relevant (does not commute during flood).
Fransiscus	No.
Natalia	Longer route.
Margareta	Not relevant (experiences no floods when commuting).
April	No.
Ayu	No.
Wilhelmus	Different route without floods.
Firda	No.
Monica	Sometimes highway during flood.
Indra	No.

Table 3: Route changes

5.3 Additional costs

Coping with floods can lead to additional costs like multiple studies have shown like one from Harwitasari (2009) in; *'The adaptation responses to tidal floods in Semarang'* which shows what adaptations people make to protect their houses (which can cost money). In this research the students were asked about possible additional costs for travelling during flood. Students have to find ways to be able to cope with the effects of the floods if they want to get to Unika and back. Table 4 shows which students have additional costs and in brief what these are. A lot of students said they spend money on extra fuel. This was pretty much self-evident for those who experienced longer travel times due to floods and took different, longer, routes. Not all students thought about these costs at first, but when asking specifically about it many told this to be the case for them as well. Cathy answered; *"oh yeah for the fuel"*. Indra was the only one not sure about it even though the commute takes longer during floods. Other costs mentioned by many were the repair costs for the damage being done by the floods to the motorcycle or car. Their vehicles broke down during the commuting to Unika. Besides repair costs April also goes to a motorcycle wash to get all the dirt off caused by the floods.

"When her car breaks down she needs repair." (Firda, translated by Mona)

"Travelling during flood is more expensive because of the fuel, because it is far he needs to buy fuel more and when using the car to the highway he needs to pay (toll) and when motorcycle breaks down (for repair costs)." (Edo, translated by Mona).

Other costs come from toll, when students used the highway as an alternative route to avoid commuting through floods, and Hotels. The ones who did go to hotels did not do it very often, or even only once, so this was not something they had to deal with very often. Next the students were asked if they save money for these costs. Only a few put money aside (see table 4) for costs that were quite different for each of those students. Most of them saved money for gas and the rest was for hotel, repair costs, motorcycle wash and toll. A lot of students who did not save money were answering the question if it was only logical they did not.

Name respondent	Additional costs for travelling during flood	Save money
Ruth	Repair costs motorcycle (rarely).	No.
Cathy	Extra fuel.	No.
Melissa	No.	No.
Naomi	No.	No.
Shenny	No.	No.
Marcus Eric	Extra fuel.	Yes.
Tania	Extra fuel and toll.	No.
Oktavia	Repair costs motorcycle (rarely).	No.
Yosua	Non .	No.
Edo	Extra fuel, toll, repair costs motorcycle.	No.
Marwanto	Does not travel during flood.	/
Fransiscus	Hotel.	No.
Natalia	Extra fuel.	Yes.
Margareta	No.	No.
April	Repair costs and motorcycle wash.	Sometimes.
Ayu	Repair costs motorcycle.	No.
Wilhelmus	No.	No.
Firda	Repair costs car.	No.
Monica	Repair costs car, extra fuel toll and hotel	Yes.
Indra	Repair costs car.	No.

Table 4: Additional costs travelling during flood

5.4 Live elsewhere

Avoiding floods can be a reason for students to move somewhere else. This could be with family, friends, in a hotel or other possibilities. Shenny, Marcus-Eric and Marwanto live with family temporarily. Only Marcus-Eric leaves his house before a flood strikes, or at least tries to do so. When it starts raining hard he decides to leave his house as he knows this often leads to floods in his living area. Shenny makes arrangements with her uncle before she goes there. For Marwanto it is more of a reactive decision and only takes action when the floods already occur. Edo has a whole different story; he goes to his office, owned by his father, to stay for the night when it is flooded. This way he avoids the bad water conditions and also need less time to get to Unika since the distance is shorter than it is from his house to the university. Wilhelmus does not decide to get out of his neighbourhood but moves to a different part of his house instead. His house is (incidentally) built in a way one part is higher than the other and to avoid wet feet he moves to the higher part. Four of the students have been staying in a hotel before. Ruth only did so once, Tania only does so when the floods are severe and Fransiscus sometimes decide to stay in a hotel room.

The majority of the twenty interviewees did not leave their house because/during flood. Most did not deem it necessary to do so. It is likely there were other reason for this as well, like someone did not have a connection which he or she could easily ask to stay there, but this is only implied. Sometimes it seemed some students did not feel like telling the whole story or reason for their decisions. Firda did tell she does not have any relatives living on Java and does not stay with other people either.

Name respondent	Live elsewhere because of flood	Make arrangements before flood
Ruth	Hotel once.	No.
Cathy	No.	No.
Melissa	No.	No.
Naomi	No.	No.
Shenny	With uncle.	Yes.
Marcus Eric	With cousin.	Yes, leaves when rain starts.
Tania	Hotel (only severe floods).	No.
Oktavia	No.	No.
Yosua	No.	No.
Edo	Office (belongs to father).	No.
Marwanto	With uncle.	No.
Fransiscus	Hotel (sometimes).	No.
Natalia	No.	No.
Margareta	No.	No.
April	No.	No.
Ayu	No.	No.
Wilhelmus	Switches between homes.	No.
Firda	No.	No.
Monica	Hotel.	No.
Indra	No.	No.

Table 5: Alternative temporary living locations

5.5 Problems along the wayHeyendaalseweg 141

The students were asked to describe what problems are accompanying the floods when commuting to Unika. The water itself makes it harder to drive and Firda had an accident because she lost control over the motorcycle due to the flood.

"The water is everywhere so sometimes it is hard for the motor to pass the water." (Ruth)

A problem frequently mentioned were the traffic jams during floods. Floods can cause chaotic situations on the streets for cars, motorcycles and other transportation vehicles. Wilhelmus told about the situation he faces; *"When it is flooded always traffic jam"*. For Natalia it is not even possible to reach the main road because traffic jams block the way during floods. During observation we drove through some streets (figure 12) near the living areas of some students that are very prone to floods which can be much worse as shown on the pictures.



Figure 12: Flooded streets

The traffic jams cause delays in the commuting, sometimes long sometimes short, and students need to leave their houses earlier. For Monica it can take up to two hours longer than usual to get to the university and for Firda up to one hour. Next to traffic jams the malfunction of transportation vehicles was one of the biggest problems experienced. Firda uses either an automatic car or motorcycle and when these get stuck they will not move at all.

'In march last year the water was so high the motorcycle could not get through and stopped' (Wilhelmus).

Not only the students have these problems but many other people using the road as well as also told by students like Oktavia (translated by Mona);

'Few people who fell down because of the water of the flood from their motorcycle or sometimes their motorcycle breaks down.' (Oktavia)

Shenny does not have to go far to witness these scenes as cars often break down in front of her house because of the water. Because so many other people experience these problems on the roads as well, it worsens or even causes the situation of the traffic jams. Another risk for the transportation vehicles, but also even for the student drivers, is the condition of the

roads. The high water can make it impossible to see obstacles or holes in the roads. The quality of the roads gets worse due to the floods and Tania experiences this first handed right in front of her house. Natalia even had an accident because she drove into a hole she could not see and fell down. Wilhelmus learned to remember where the holes are and never has accidents but told he often sees other people have because of it.

5.6 To commute or not to commute

"When it is worse I cannot go to university, just stay at home. Sometimes the flood is so worse, traffic jam everywhere." (Cathy)

The experience of the floods and the problems associated with floods can be a reason for students to stay at home instead of commuting to Unika. Marwanto for example couldn't get out of his street and Oktavia does not go when the water level is too high.

"I got trouble with the accessibility because the road had a lot of water so...there are no shortcuts or there are no other ways." (April)

Most other students find ways to cope with the problems and still manage to go most of the time. Commuting to Unika during flood can be a risky procedure though, as was made clear in the previous section. However there are students who take the risk and force their transportation vehicle through the high water (which can lead to these getting damaged or broken) like April who *"forces the motorcycle to go through"* (Mona). April does not have a different choice to do so as there are no alternative routes and *"there is no access for public transportation"*. Ayu also told *"it is difficult because of the flooded roads"*. Some are able to prevent bad things to happen by changing their routes like discussed before. Margareta was the only one experiencing floods at night only and never during the times she needed to commute to Unika. Therefore she had no reason to stay at home.

Name respondent	Ever decides not to go to Unika
Ruth	Yes.
Cathy	No.
Melissa	No (only thought about doing so).
Naomi	No.
Shenny	No.
Marcus Eric	Yes (about once a month).
Tania	No.
Oktavia	Yes (determined by the water level).
Yosua	No.
Edo	No.
Marwanto	Yes (not possible to go to Unika).
Fransiscus	Yes.
Natalia	Yes (once a month).
Margareta	No (never experienced flood when travelling to Unika).
April	Yes (only once).
Ayu	No.
Wilhelmus	No.
Firda	Yes (once a month).
Monica	Yes (often).
Indra	Yes (mostly).

Table 6: Decisions whether to commute

6. Understanding the commuting decisions

The previous chapters show the results of the fieldwork that was done in Semarang. The stories of the interviews with the students and the observations will be analysed by using the theoretical framework of chapter two (in which a conceptualisation is presented for commuting decisions). Like in the previous chapter, this analysis will be in different parts focusing on the commuting processes itself with the choices made for commuting before or after it. The living locations of the students and their general flood experiences function as a context for analysing the commuting decisions and ways of coping.

6.1 Flood experience

Although the students lived widespread over Semarang all of them had frequent experiences with floods. From the three causes of floods Semarang faces; local flood inundation (mainly caused by rainfall), river flood and tidal flood, rainfall was designated as the main cause by the students (Dewi, 2007, p. 11)(Harwitasari & Van Ast, 2011, p. 3). Some experienced rob as well. The living area foremost determines the experiences with floods in the neighbourhood and in home. However the latter was also determined by the actions taken by students and/or others living with them in the house (mostly family). If the house was elevated the experience with water entering the house were either much less or did not even occur anymore. Some students told they noticed an increase in the severity of the floods each year and elevating the houses was one solution taken by a student family. It seemed like the responsibility of protecting houses and livelihoods lies with the students and their families themselves (Worldbank, 2013). The observations showed how some people in flood prone streets were able to elevate their house while others were not. This inequity within the neighbourhoods seemed to cause problems with draining excessive water when some people take action by protecting their houses while others were not (Kumar, 2013, p. 1461). This was shown by the houses that were not elevated yet, like some of the students, and were in an even more vulnerable position because they were between elevated houses (see left picture figure 09). The houses ended up lying in sort of a hole allowing water to flow in faster and causing problems with the drainage of the excessive water.

The little canals on the sides of the streets seemed to be helping somewhat with the problems although these were not capable of draining excessive water during severe floods. This slight city planning action was only a small consolation compared to the problems insufficient planning in the students neighbourhoods caused. The elevation of streets and new buildings in or near the low lying living areas caused even more serious results of floods for the non-elevated streets. Although it is acknowledged by the city of Semarang that the infrastructure needs improvement it certainly is an ineffective way of letting these particular processes continue for the students living conditions.

The students also had to deal with uncertainty about the occurrence of the floods. The rainfall was pretty much unpredictable and weather forecasts did not seem to provide exact predictions. Only the start of the rainfall was a sign floods would likely occur within hours.

The floods were a reason for many students to stay at home instead of performing their usual daily activities. This shows how the floods did have an impact on their livelihoods.

6.2 The commuting processes

The stories told by students give a clear image of the choices they make during their commuting between home and Unika. These results will be analysed through the conceptual model of commuting decisions provided in chapter two. Again it consists of four categories; mode choice, time choice, location choice and route choice. Each of these shall be discussed separately although these are not independent of each other. One category of choices can be a determining factor for other choice categories. Therefore the end of this section discusses the relation between these categories.

6.2.1 Mode choice of commuting

The first choice in the commuter's decision framework and the first interview question was about the way 'how' the students commute to Unika. The clear image from the observations and the interviews is that students mostly use their motorcycles, with the car being a close second, both in times of floods and without. This is not exceptional when compared to the vehicles seen on the streets in Semarang. Public transportation was not even considered by one of the interviewed students and it did not seem very popular for other Unika students either. This became clear during observations on the campus looking at the way students came to that location, public transport was rarely seen. So the question arises what could be the reasons students rely heavily on their own private transportation vehicles? Therefore looking at the utility gives some possible explanations. Again the functions of utility include Objective price, level of service factors, travel time, travel cost but also variable taste (Schwanen and Mokhtarian, 2005, p. 84)

Looking at the utility of a motorcycle first tells the costs for a motorcycle itself are relatively cheap or are at least a cheaper option than a car. With options like easy down payment for these vehicles it is apparently an attractive option and not only for students. Indonesia has the third largest market in the world for motorcycles with 71 percent of the motor vehicles in Indonesia consisting of motorcycles in 2003 and estimated numbers show this percentage has grown since then (Worldbank, n.d.; Indonesian Commercial Newsletter; Living in Indonesia). These numbers show using motorcycles can at least be considered normal. This was perhaps the reason for the answer to the question about the use of transportation vehicle of those students who use a motorcycle; almost like it was self-evident. The students using a car did not always owned one by themselves but were able to use one because they could lend/use it from friends of family. It seemed more common to have a motorcycle in possession than a car.

Besides the purchasing price the cheap gas prices could be another reason for using a motorcycle. The cheap price for gas came up several times during conversations with the students who helped with the translation during the interviews. During floods the students sometimes chose longer routes which obviously lead to more money for gas. The gas price would probably be more of an issue for a car but may not be reason enough for preferring a

motorcycle over a car besides its purchasing price. Cars in Indonesia only made up 16 percent of the total motor vehicle population in 2003 (Worldbank, n.d.). Next to the purchasing and gas price using a motorcycle seems so normal under a wide variety of Semarang citizens and students. The personal 'taste' may be related to this (Schwanen and Mokhtarian, 2005, p. 84). For both car and motorcycle the costs for parking would not be a decisive factor as parking at Unika is free. During the fieldwork on the campus there always seemed to be some places left for parking a car. Motorcycles could always be more easily stationed by using creatively parking styles (if it fitted it could stay there). Because there did not seem a shortage of parking spots there were no reasons for students to park somewhere else where there might be charged parking costs.

The traffic in Semarang can be hectic to say the least. The students using a motorcycle are more agile than when they use a car because and it is very usual to manoeuvre through traffic with a motorcycle, looking for the smallest possible spaces to pass traffic. Since city traffic in Semarang is slowly moving and it is easy to end up in traffic jams the motorcycle is often the faster way to get somewhere. In terms of practicality the car does provide the option to travel with more people and is more comfortable to drive with company, while the motorcycle can only fit just that many people. In the interviews though there was not much of a difference between a motorcycle and a car in the number of students who travelled with company.

Only few students changed their transportation vehicle or had plans to do so in advance. There are some differences along the students why this happened. Glanz et. al. (2008, p. 129) stated that a person appraises the situation and the resources and then makes a coping effort. There were students who apparently appraised the situation and concluded it was not needed to change their resources i.e. transportation vehicle efforts. They did do so by choosing one transportation vehicle over the other for its features or utility suitable for the floods. This could be for practical reasons like safety, or because it enabled them to use the highway by choosing the car. However some students could appraise the situation and conclude that they would be better off changing their transportation vehicle but did not have the resources i.e. other transportation vehicle to choose from. Also it did not seem any of the students were planning on looking for possibilities to use a different transportation vehicle in short terms. The resources (transportation vehicles) only included private vehicles and not public transport as a commuter in different locations might include in the appraising. The flooding conditions did not allow much possibilities for using public transport as these services did not operate in flood prone areas during floods.

The small number of students who did change their transportation vehicle were either able to do so because they were in the possession of two transportation devices or other people enabled them to use one they did not have by themselves. In the last case social relations like family or friends enabled some students to cope a certain way to be able to commute by providing them transportation possibilities (like lending a car or pick them up). The decision of changing the choice for mode of transportation was mostly made just before commuting to Unika. Only Firda, Melissa and Tania seemed to make this choice more proactively or the choice was sort of made for them by the people they travelled with (friends, boyfriend or driver). However when students changed their route often into longer routes they had to deal with additional prices for extra gas. For most this difference was no reason to put money

aside. Some students did do so they and acted more proactively, so they knew for sure they would be able to pay the price for commuting during flood.

6.2.2 Time choice

The mode choice is related to the choice of time i.e. departure time. If a student chooses to travel by car he or she risks ending up in a traffic jam. Then there is no other option than to wait while the motorcycle can be sort of forced through traffic. This means the type of transportation vehicle can be important for the decision on what time to leave home to commute to Unika. In the interviews this was never mentioned by the students who could make a decision in choosing between a car and motorcycle. However traffic situations and the driving of some of the students implied this driving style was common. During a flood there did seem a preference by some students to use one option over the other. Using a car allowed students to use the highway to escape the flooding situations. Common problems with time were the traffic jams caused by floods on the usual routes. Therefore choosing the highway instead could save a lot of time.

Some students who did not change their transportation vehicle, some did not have the opportunity to do so, had to leave home earlier for multiple reasons. First was because of the bad traffic situations (Mannering & Hamed, 1989, p. 100). Some students did not have an opportunity to choose a different route because it was the only route and could easily end up in traffic jams. Not leaving home earlier because of this could lead to unacceptable arrival times (Jou & Kitamura, 2002, p. 1-2). The experiences with the actual arrival time (AT) were a reason for some to leave home earlier (Jou & Kitamura, 2002, p.2). Students had experiences with delays up to two hours. Other students decided not to change their departure time by commuting later or not going at all to Unika. The reason could either be because they were forced by the floods or because they had the option to change their study schedule.

The high water itself made it harder for the students to drive through the streets, even when there are not that much problems with traffic. Since they experienced floods frequently the students had quite some experience with commuting to Unika with these conditions. During the interviews it became clear students knew quite well what changes they needed to make in their departure time and did not need to think about it anymore when they were confronted with a flood. So while they were sort of forced to take the decision reactively as the floods are pretty much unpredictable, the decision would already sort of be made before.

The choice of location discussed in the next paragraph did also influence the departure time. If students decided to live somewhere else temporarily and leaving to Unika from that location they could save some time for not having to deal with the floods. Not only that, for some students these locations meant they were closer to Unika, which alone could save time. The reason for moving somewhere else did not necessarily have to be for the ability to commute to Unika but could be for other reasons as well. When it is considered an action for commuting possibilities it could be seen more as a proactive decision to save time as well.

6.2.3 Location Choice

The conceptualisation of the commuter choice (n.d., p.9) shows location choice includes either where to work or whether to commute. In this research it only included whether students would commute to Unika or stay at home. Students need to attend classes at Unika but also have to study on their own (or with a group) for which a student can also decide to stay at home. The reason for deciding not to go to Unika during a flood varied among the students. Some simply did not have any possibilities to commute to Unika during a flood (because of access problems of the roads and such) and the choice was sort of made for them. Others could perhaps decide to go but it would be hard dealing with the floods, therefore deciding not to commute. Some students could commute but decided to stay at home because it was not a big problem for them to skip class. It seemed the consideration of travelling through flood or skip class was made during or just before a flood occurred. Because of the unpredictability of the floods this choice seemed more reactive than proactive.

However there were some students who did not always stayed at home and sometimes they acted more proactively by staying somewhere else when it would get, or already would be, flooded. By moving to friends, family, workplaces (exception) or a hotel, students were capable of escaping the floods. Not only that, they suddenly had new possibilities for commuting to Unika since they were in a more advantageous position. This was more of an exception than a rule though. The students who lived in hotels temporarily from time to time mostly did not save money for it because it did not happen that often. Surprisingly few students did live elsewhere temporarily though and in some cases it was not even with family or friends but in a hotel. In addition, only some seemed to do it more than just a couple times. The main reason for not sleeping anywhere else did not seem because they did not have any options but because they appraised the situation and apparently did not deem it necessary. It must be added though there might be more reasons than students told during the interviews, like feeling uncomfortable to ask family or friends but this is also nothing more than an assumption based on observations of cultural habits.

6.2.4 Route choice

Like the experience with travel time, students also had much experience with the routes between their home and Unika. This experience is a determining factor for the choice of route (Commuter's choice, n.d., p.11). For part of the students the route differed during floods. They had experience with the route they usually take when there are no floods and knew this would not be a suitable option. The condition of the roads also played a part in the decision making. Bad road conditions like holes in the road are a problem in Semarang, which are partly caused by floods. These holes can be dangerous and experience with a route does help to know where to watch out. However a flood makes it much harder to know where these holes are. There were students who experienced accidents because of this. The experience with the roads did enable some students to use it even during flood, knowing where the holes are and could commute to Unika unscathed. Experience with routes leads to more reference points which can be influential to make route adjustments along the way

(Senbil & Kitamura, 2005, p. 376). While the students had lot of experience with their routes and probably had many reference points, the choice of route did seem to be made mostly from the moment the students left home and not so much along the way. It seemed like most students had a usual route for commuting during non-flood periods and mostly just had one, some two, alternative routes for commuting during floods.

Besides route experience the experience with floods played an important role in choosing what route to take. The floods experienced by the students were mainly caused by rainfall. Many students knew that when it started raining heavily this would probably lead to a flood. Some used information from weather forecasts but mostly this did not seem very accurate and the rain usually occurred suddenly as a surprise. With the experience about the relation between rain and floods the students knew before leaving the house which route to take. So while the decision **to** change the route might be more reactive than proactive considering the time it was made, the decision **which** route would be chosen more proactively as they already had enough experience to know which they would chose every time a flood occurred and they had to travel to Unika. None of the students mentioned using traffic information to know where there might be traffic jams which could have to do with the fact that the flood was the first determinant of the choice of route. Students also told about knowing there would be traffic jams anyway during floods. The alternative roads were either higher, longer or required paying toll (the highways). The costs for using the highway were sometimes saved for by students. This proactive decision enabled them to have money for using the highway and be able to commute to Unika during flood.

The four categories together

The analysis of the four categories showed the student decisions in one category influence decisions in other categories. For example being able to use a car allows for using the highway as an alternative route during flood, a route that motorcycle using students do not use. Or choosing a different route during flood could save time and influences the departure time from home. There are numerous other examples because each student makes different decisions within all four categories and it shows how some decisions in one category enables or disables other decisions. Sometimes students do not have options to change their decisions like choosing a different transportation vehicle or changing routes (because there are no other options) and this sort of automatically determines other decisions including the choice whether even to commute or not.

7. Conclusion

The goal of this research was to obtain insight in the influence of floods on the commuting of Unika students between their homes in flood prone areas and the University. This in order to contribute to the knowledge about the discussion of the influence of climate change on the lives of those living in areas prone for its effects. Therefore a case study was conducted by doing interviews and observation during the month of fieldwork in Semarang. Before that a literature study was done on the effects of climate change on the city of Semarang. The small scale of the study delivered some interesting insight of a highly mobile group in a dynamic city, exemplary for the climate change challenges increasingly faced in cities all over the world. These insights gathered through analysing the data will give the answers on the research questions. Then a discussion will follow in a broader sense on the influence of climate change on commuting. This will be followed by some recommendations for further research. In the reflection there will be looked back on the research implementation and the results.

7.1 Concluding remarks

The findings in the previous chapters allow for the answering of the research questions presented in the first chapter. First this will be done for the two sub questions leading to the answering of the main research question.

How do Unika students experience floods in their flood prone living area?

The goal of this research question was to give some context of the student's experience with floods in their living areas to better understand why they make certain commuting decisions. Although there was a huge variety in the home locations almost all students had frequent experiences with floods mostly caused by rainfall only. The students told the rainfall was unpredictable, which meant they had to live with some uncertainty when the floods would strike. This made it harder to take measures far in advance. The only certainty was knowing severe rainfall would almost certainly lead to floods within hours.

Most students had experiences with water entering their house. Those who did not either lived in areas less prone to floods or their houses were elevated. Students had different experiences with the duration of the floods. It was often hard for them to tell what the average duration was because it varied so much for each student themselves. However it mostly took up to half a day till a day, there were some stories about cases of floods taking up to several days. Knowing this shows how a flood can really affect the lives of students on the days of floods. This was also reflected in the performance of daily activities; some students did not leave their house during flood, while they would usually do things outside of the house. The flood conditions and experience alone already gave an image of the extent of the problems that were caused for travelling out of the house and commuting.

What decisions do Unika students make for commuting between home and Unika during flood?

Nearly all students had to deal with situations in which they had to commute to Unika when flood occurred in their neighbourhoods and/or along the way. Corresponding with the general experiences of floods this was usually several times a month. The conditions of the floods were of such severity that the majority had to make several decisions to cope with the floods in order to get to Unika (and back). In all four categories of the commuting decisions conceptualisation it was seen how different students made changes due to the floods. These included changing from using a motorcycle to a car or vice versa because of personal preference and/or utility differences, choosing a different route with better water conditions, leaving home earlier because of the additional time for travelling during floods or changing their living location temporarily to avoid the floods. Most coping behaviour was seen in more reactive decisions but there were some cases of proactive ways of coping as well. It can be said the floods did have significant impact on the commuting between home and Unika. The floods made it hard and risky to use the roads or get through traffic and the students had to make numerous adaptations in their commuting decisions to ensure they could get to Unika, which was not always possible. However despite this the students mostly seemed capable (if provided with some luck) commuting to Unika during floods. They knew by experience what decisions had to be made in order to get there.

How are Unika students, living in flood prone areas, influenced by floods in their commuting between home and Unika?

With the answering of the sub questions it has become clear dealing with the floods is certainly a considerable part of the life of these students and works through in their commuting between their homes and Unika. Because of their extensive flood experience it did seem it was just accepted as a part of life though. This experience also enabled them to know how to cope with the floods during their commutes which showed in their commuting decisions. Despite the lack of predictability of the floods long time before these occurred it seemed like they had developed habits over time in the way they dealt with floods.

In light of the discussion of climate change impact on livelihoods it seems like the aspect of commuting definitely can be threatened. This does not mean people cannot be capable of coping with it like is shown by the students in this study. However these students stand for a group that is highly mobile and have (access to) the monetary sources that enable them to cope with the floods in their commuting processes. Also because of their level of education this group is possibly more conscious in their commuting decisions than others facing the same challenges. The situation of people living in flood prone areas as sketched by Dewi (2007) and others show how others do not always have the same possibilities, partly because of their lack of monetary sources and are more bounded to their living areas. Students are likely to be less bounded to their current living location and have possibilities to make a career somewhere else with the change of moving. The impact of floods on the commuting possibilities of people in different situations can be more severe. With increasing flood problems and other climate change threats the possibilities of the commuter can get very limited, especially for those more bounded to flood prone areas. If vulnerable cities in developing countries will not grow sustainably for the increasing amount of people living in it, this will not improve. Since commuting plays such an important part in sustaining livelihoods

it deserves more attention, especially for the alignment of sustainable urban development. Infrastructural changes are needed and roads should be more protected for floods in order for people to be able to commute. High water levels on roads make it difficult for the commuter to get from home to work and vice versa. Also with so many people experiencing these problems floods often lead to traffic jams making it even harder to make the trip.

7.2 Recommendations and reflection

This research will hopefully be followed by many more on the subject of flooding and climate change effects on commuting. This study contributes to the understanding of flood effects on commuting but is too small to say much about Semarang's flood experiencing commuters in general. It focused on students which are just a select group of people who commute on a frequent basis with possibilities other commuting groups not always have. Therefore there is much to discover on other groups of commuters as well to understand the scope of the problems caused by floods. By doing so there could also be looked more into the reasons for the commuting decisions covering more influential factors for a more complete understanding. Getting to know more about the flood perception of commuters would be a start.

In these times where developing countries all over the world have to deal with climate change threats there are many problems that deserve and need attention. The influence of climate change on commuting is certainly one that needs to be researched much more extensive and thorough. Cities like Semarang already acknowledge the fact infrastructure needs to be developed efficiently if a sustainable city is the goal in mind. In order to do so commuting patterns need to be understood, including the problems commuter's face when trying to commute to work or study. With such knowledge there can be made infrastructural improvements where it is needed most, improving the city's commuting possibilities.

For the Unika students this study may show what commuting possibilities they have, but might not be aware of, by looking at the commuting decisions the students in this case study make. If so, it might enable more students to commute to Unika and improve their commuting processes. In the same way it can also help other students and non-student commuters as well. For the University of Unika the stories of the twenty students can contribute to the understanding of the challenges some of its students face when trying to commute from home to Unika (and back). Especially for those students for whom the commuting problems caused by floods make it a lot harder to succeed their studies, this understanding might be a reason to look for possibilities to accommodate the students in this.

Reflection

Looking back at the research process it can be said the month of fieldwork in Semarang was very useful for getting to know more about the influence of climate change on commuting. However when the time, in which this research was completed, would have been longer more students could have been included for interviews and observation of their neighbourhoods and commuting processes. This would have enabled the generalization of the effects of floods on the students. With the twenty students there were plenty similarities that allowed for generalizations but there still were a lot of differences in their stories as well. It would be relevant to see if some decisions only made by a few (like the decision to live somewhere else temporarily during floods) can be seen with other Unika students as well, or students from other Universities.

The conceptualisation of commuting decisions could be expanded with more understanding of the reasons commuters make certain commuting decisions. There is also more to say about the perception of the floods and what role it plays in the daily lives of the students. Comparing flood threats to other challenges they face can tell what their priorities are. In the interviews there could be asked more about possible other worksite locations they go to during flood, besides Unika and home. Including exact route changes during flood can contribute to the understandings of the effects of floods on commuting patterns. This would especially be useful for future infrastructural planning when more respondents are included.

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Appendix: Interviewguide

Introduction

What do you study here at Unika?

How many days a week are you at the university?

Do you go home in between classes or do you stay at the university during the whole day (one trip to the university and back)

In what area of Semarang do you live?

Do floods occur regularly?

How often?

How do you experience a flood? In house? Or neighborhood?

What type of flood occurs? Rainfall? Rob (tidal)?

What is the general duration of a (single) flood?

At what time of the day does a flood usually occur?

Are the floods predictable?

If not, to what extend does this cause a problem?

What do you do during a flood? Stay at home? Or is it not really an obstacle?

Flood impact on travelling to Unika

How do you usually travel to Unika (transportation vehicle)? Alone or with someone else?

Do you experience problems getting to Unika during flooding?

- If so, what are they?
- Do you ever choose not to go to class because of a flood?
 - If so, how often?

Do you change the way you travel to Unika during a flood? If so what changes and why?

- With other people?
- Do you feel like you are prepared for a change in transportation when a flood occurs? If so in what ways?

Do you change the route you take to Unika? (Added during the interviewing process, after having already done some interviews)

Does a flood make it more expensive to travel to Unika?

- Where do these extra costs come from? (Transportation/housing)
- Do you save money/taking into account for these costs?

Do you keep living at home during a flood or do you (sometimes) live somewhere else because of the flood? ((temporarily) live with family or friends?)

- If so where?
- Do you make arrangements for living somewhere else before a flood or when a flood already occurs?