

The future, something for tomorrow



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Summary

Climate change has become the primary environmental concern of the twenty-first century. The global sea level will rise and it is expected to cause other compounding effects. This global sea-level rise is the result of an increase in global ocean volume from the thermal expansion of water and the melting of land-based ice and will possibly have a great impact on coastal populations and coastal ecosystems. Indonesia is placed third of most vulnerable countries due to flood hazard in Asia, after China and India. More than 50 million people live in coastal cities in Indonesia, and due to a high concentration of people, buildings, infrastructure, and socio-economic activities in these cities, there will be tremendous losses and damage when such a severe flood strikes. In some regions in Indonesia, the flooding situation is problematic because of poverty and lack of technology know-how on flood management. For Semarang, seawater tidal flooding under enhanced land subsidence is a major threat for their city development. The elevation of the low lying area in Semarang is lower than the existing sea level because of the high subsidence rate that occurs due to over-exploitation of groundwater and the rapid development in the coastal area of Semarang. This causes tidal flooding to spread on the low land damaging the infrastructures and coastal settlement. Tidal flood hazards also impact the community, households, and individuals in Semarang simultaneously.

Instead of focusing on the community, households, and individuals this research focuses mostly on the small businesses settled in the suffering areas. The following research question is derived in order to do so:

How does tidal flooding affect the livelihood and vulnerability of small enterprises?

In order to answer the main research question theoretical underpinnings about livelihood, vulnerability and different kind of responses are made. "Making a living", "supporting a family" or "a job" all describe a livelihood. The term is well recognized as humans inherently develop and implement strategies to ensure their survival. Important for further operationalization is to note that livelihoods have an enormous range of strategies to choose from. This research will focus on the sustainable livelihoods approach and the livelihood security approach because both approaches seem to have a lot in common with the community of Tambak Lorok. The risk of livelihood failure determines the level of vulnerability of a household to income, food, health and nutritional insecurity. There are, among other things, three components to figure if a livelihood is secure, namely jobs, skills and a safety net. To create a secure livelihood all three of these components should be addressed, which is not the case in Tambak Lorok. Thus the livelihood of small business owners can be seen as insecure. While the floods are influencing the income, health and security of households and can therefore be seen as livelihood failure, this all is causing a certain level of vulnerability. Because of the risk of livelihood failure, the level of vulnerability is maintained.

Vulnerability is another concept that is of great importance in this research. Vulnerability is the propensity of human and ecological systems to suffer harm and their ability to respond to stresses imposed as a result of climate change effects. This vulnerability is generated by social, economic and political processes that influence how hazards affect people in varying ways and with different intensities. Some groups are more prone to damage, loss, and suffering in the context of differing hazards, for example the small businesses in Tambak Lorok. When looking at the exposure to vulnerability it becomes clear that the ecosystem of Tambak Lorok is greatly determined by the environmental conditions. Flooding has a great influence on the daily lives of the inhabitants of Tambak Lorok and thus on the small businesses and their owners. The shops are all attached to the homes of the shop owners and are not movable, which means that not only the homes of the inhabitants of Tambak Lorok are very vulnerable for the flooding, but their shops are too.

In order to research the influence livelihood and vulnerability has on small businesses in Tambak Lorok different shop owners were interviewed. Besides asking them about the influence flooding has on their business, observations were made of the concerning shops. Furthermore an expert was interviewed in order to obtain information about the future perspective of the area and to obtain data about the responses of shop owners in Tambak Lorok.

The responses used in this research are adaptation, mitigation and non-response. Adaptation refers to adjustments in ecological, social, or economic systems to reduce vulnerability or enhance resilience in response to actual or expected climatic changes, their effects or impacts and associated extreme weather events. The small businesses in Tambak Lorok manage this adaptation themselves by heightening their houses. Mitigation is the action to minimize the impact of a potential disaster, but is a form of response the small businesses not really seem to use. Non-response in this research means that although inhabitants maybe know flooding is a problem and that it should be addressed, they don't because it is not on top of their priority list. It could be that the daily life with the daily struggles they face is more prioritized than the need to be protected from the flood. At the moment the heightening of the homes and shop as adaptation measure is enough, but the problems will only grow in the future. Because of the climate change the flooding will get worse, while the level of knowledge, money and power are staying the same. This will lead to more non-response, while they are not able to tackle the problems and thus choose to ignore them. This will cause more and more problems they cannot solve.

As the tidal flooding will only get worse, it is of great importance to further protect the inhabitants of Tambak Lorok by building a dike or dam to reduce the flooding. Although it will not be enough to completely stop the flooding it is the best thing that can be done for now. To keep the inhabitants safe in the future it is best to give them knowledge on how to survive and adapt to the situation because they refuse to move. Furthermore, for the small businesses to be able to keep their businesses in the future it is of importance to raise awareness of the hazard of climate change so they can eventually become self-resilience people.

In conclusion, the livelihood and vulnerability have effects on small businesses. These effects influence in their turn the type of response small businesses use. The type of response affects the livelihood and vulnerability. In Tambak Lorok this leads to a vicious circle the small businesses cannot breach. It is important to set up a cooperation between different parties like the government, the local inhabitants, the university and a few (nonprofit) organizations to improve the situation in Tambak Lorok. Without help from third parties this vicious circle will not be breached, which will lead to more dangerous situations for the small businesses of Tambak Lorok.

Preface

Going to Semarang for my bachelor thesis was an amazing experience. Indonesia has beautiful landscapes and the people are extremely friendly. Everybody wanted to help and made sure I felt at home in a completely unknown country. So, first of all, I would like to thank Mrs. Oely and Mr. Donny for their warm welcome and assistance during my research in Semarang. Furthermore, I would like to thank Mrs. Rini for not only letting me interview her, but also for making time to do the interview again. Mrs. Rini, thank you so much for all your information and your helping hand. I would like to thank my supervisor Lothar Smith too, for his positive outlook and feedback during my research and his support, which made me more confident about what I was doing. Although the interviewed inhabitants of Tambak Lorok might not read this thesis I would nonetheless like to thank all the respondents who wanted to contribute to this research by letting me interview them. Talking with them gave me a great insight into the way people live and think. I would like to thank my fellow students who joined me on my trip to Indonesia for all the brainstorm sessions and the great company. And last, I would like to thank Valerie, she was not only a very valuable translator but she really helped me conduct good interviews; and Rena, who was not only a very useful translator and helped me a lot but was also a perfect friend in an unknown country.

But, I would like to mention something else too. Walking through Tambak Lorok and talking with its inhabitants made me discover how friendly these people are, offering me drinks and food and not wanting anything in return, even when they struggle to earn enough money themselves. Everybody wanted to help me and was willing to talk to me for my research. But, although everybody wanted to help, walking through this area of Semarang made me feel slightly uncomfortable because of the differences between the inhabitants and me. It felt like I was jeopardizing their way of living when I took photos of it all. And even though the residents did not once point out our differences I still felt guilty for walking in and out of their lives without really being able to help or make a long-term difference.

Nijmegen, August 2018

Anniek Timmerman

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Pictures:

Unless stated otherwise, pictures in this thesis are made by Maike van Delft and Anniek Timmerman.

Maike van Delft figure: front page, 18

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1. Introduction

It is fascinating how people show different responses when struck by a flood. Approximately ten years ago, people in areas like Tambak Lorok in Semarang started to experience these floods. It is not only fascinating to see the different ways they are responding to it, but also whether climate change increases flooding and has for an influence to their livelihood and vulnerability. For example, does flooding influence the way they are running a business in Tambak Lorok? For starters, we first will explore this way of flooding a bit further.

1.1 Project framework

Truly, we do live on a “water planet.” For us, water is that critical issue that we need. It’s the most precious substance on the planet, and it links us to pretty much every environmental issue, including climate change, that we’re facing. — Jacques-Yves Cousteau (2009).

Climate change has become the primary environmental concern of the twenty-first century (Munasinghe & Swart, 2005). According to The Intergovernmental Panel on Climate Change (IPCC), the global sea level will rise in the 21st century and it is expected to cause other compounding effects. The main cause of this rise of the sea level is contributed to the increased intensity of global warming, which is also known as the greenhouse-effect. This global sea-level rise is the result of an increase in global ocean volume from the thermal expansion of water and the melting of land-based ice (Nicholls & Wilson, 2001) and will possibly have a great impact on coastal populations and coastal ecosystems. But, under global warming and oceanic processes such as currents and winds, the regional sea levels get influenced as well. Furthermore, the vertical change in the elevation of the earth’s surface will produce a relative change in sea level. Tectonic movements, neotectonic processes like postglacial rebound and human activities such as groundwater abstraction, or oxidation and loss of organic deposits can produce such elevation changes (Nicholls & Wilson, 2001).

Indonesia is placed third of most vulnerable countries due to flood hazard in Asia, after China and India (Dewi, 2007). According to Dewi more than 50 million people live in coastal cities in Indonesia, and due to a high concentration of people, buildings, infrastructure, and socio-economic activities in these cities, there will be tremendous losses and damage when such a severe flood strikes (2007). In some regions in Indonesia, the flooding situation is problematic because of poverty and lack of technology know-how on flood management (Dewi, 2007). For example, the coastal community of Semarang has been experiencing problems related to tidal floods, making it one of the frequent natural hazards (Marfai et al, 2007). Coastal flooding in combination with high tide due to tidal movement, wave action and accelerated sea level rise due to climate change cause these tidal floods (Harwitasari, 2009). Sea level in Semarang have risen since 1985 and are expected to rise further 40 to 80 centimeter in the next 100 years – expanding the potential inundation area inland by between 1.7 and 3 km³ (Mulyana et al., 2013). For Semarang seawater tidal flooding under enhanced land subsidence is a major threat for their city development (Dewi, 2007). The elevation of the low lying area in Semarang is lower than the existing sea level because of the high subsidence rate that occurs (Dewi, 2007) due to over-exploitation of groundwater and the rapid development in the coastal area of Semarang (Harwitasari, 2009). This causes tidal flooding to spread on the low land damaging the infrastructures and coastal settlement (Dewi, 2007). Tidal flood hazards also impact the community, households, and individuals in Semarang simultaneously (Dewi, 2007).

But not only the community, households and individuals are victims of the floods, the small businesses in Semarang suffer as well. Coastal flooding damages houses and many small and medium business enterprises, consequently impacting the social and economic sector (Harwitasari, 2009). Many people

working as small business entrepreneurs, placing their business in the inundated areas, are affected by tidal flood (Harwitasari, 2009). The flooding affects not only the social and economic sector but the livelihood and vulnerability of small businesses too.

Knowledge about the relation between flooding and the livelihood and vulnerability of small businesses could provide some useful insight in the way small businesses in Semarang respond to it. A better understanding of these responses of small businesses towards floods may contribute to institutions or governments to provide more matching measures regarding floods. This research could provide some useful insight regarding the role of education among small businesses of flooding too.

1.2 Research objective

Scientific relevance

The literature points out that there is quite a substantive set of articles and other scientific output focusing on the influence flooding has on local lives in Semarang. Research has been done about coping with urban flooding (Dewi, 2007), the impact of tidal flooding on the community (Marfai et al., 2007) and the adaptive capacity of the community (Marfai & Hizbaron, 2011). Different students have done their research about flooding in Semarang as well. For example, one of these students did research about the sense of place Dynamics in a flood prone neighborhood (van der Caaij, 2016) and another student about the effects of floods on the life of the coastal inhabitants of this city (Evers, 2014). The literature study reveals that because of climate change the risk of flooding is increasing (Nicholls & Wilson, 2001), affecting human settlements through various economic sectors, impacting infrastructure and also impacting people's health (Harwitasari, 2009). Despite this, there is not a lot of literature or research on the influence flooding has on the livelihood and vulnerability of small enterprises, although the flooding is causing growing problems for these businesses, simultaneously influencing the social and economic systems of the local community. Therefore this research will be conducted by doing a case study in Semarang. By interviewing experts and inhabitants of the area Tambak Lorok and by doing an observation, new information will be gathered. This case study will be practically-oriented, aiming to extend the knowledge about the influence of flooding on the livelihood and vulnerability among small enterprises.

Societal relevance

The impacts of flooding have greatly increased the extent and magnitude of social problems (Dewi, 2007) of local people in Semarang. Neise and Diez (2017) started to look into this issue for local enterprises, but it does not wholly fit the topic of flooding in relation with small businesses. It is important to identify how the effect of increased flood risks influence the livelihood and vulnerability of small enterprises because small- and medium enterprises often seem to be the main driver of local socioeconomic welfare in many hazard-prone countries, like Indonesia (Neise & Diez, 2017). Tidal flood disrupts day to day activities, potentially causes disease and the environmental conditions are unhygienic, dirty and it smells bad. This deteriorates the quality of life of impacted people (Hadi, 2017), and it is only getting worse. It is thus of importance to take another look at the issue because of the increasing threat flooding has on the local community and small businesses in Tambak Lorok.

Concluding, the main goal for this research is the following:

The aim of this research is to gain further understanding of the influence flooding has on both the actual vulnerability and livelihood in relation to the response of small enterprises in Semarang, Tambak Lorok.

Figure 1: Main research goal

1.3 Research questions

In order to develop a further understanding about the influence flooding has on small businesses and their livelihood and vulnerability it is necessary to capture this as accurate as possible. Because this research aims to place the small businesses of coastal and flood prone areas at the center stage of the research, these inhabitants should be centered in the research question. From this perspective, the influence of flooding on vulnerability and livelihood is questioned. The following main research question is deduced:

How does tidal flooding affect the livelihood and vulnerability of small enterprises?

Figure 2: Main research question

This research will produce descriptive knowledge (Verschuren & Doorewaard, 2015). In addition, it will give the reader insights into how environmental change such as flooding affects vulnerability and livelihood produce explanatory knowledge. The objective is to gain knowledge rather than attempting to solve the problems the small businesses are facing in the flood prone areas. This research will thus, in the end, have a strong explanatory approach.

In order to answer the main research question, several sub-questions are derived from the research question. By answering these four questions the link between the influence of flooding and livelihood and vulnerability, and the different ways of responding can be investigated. The following research questions are derived in order to answer the main research question:

- I** What do small enterprises know about climate change issues, and do they relate this to increasing risks of flooding in Semarang?
- II** Do small enterprises think flooding affects their business?
- III** How do small enterprises respond to flooding?
- IV** How do small enterprises define their future when looking at the possible risk perspectives of flooding?

Figure 3: Sub questions

By answering the sub-questions, knowledge is gathered to answer the main research question. In order to clarify this research, it is assumed beforehand that flooding influences vulnerability and livelihood. The way small business respond to flooding is of great importance too, and will thus be the third concept this research will look further into. Although flooding not only influences these three concepts, vulnerability, livelihood and the different responses could influence the impact of flooding as well. This research will not examine this though, because the given period of time would not be enough to examine another such complex process.

The first sub-question is about what small enterprises know about climate change issues and if they are able to relate these issues to the increasing risks of flooding. This is of importance to find out if they are aware of the growing problems associated with the floods getting worse. The second sub-question is about finding out if flooding indeed affects small businesses. Because without the influence of flooding there will most likely not be a link between the just mentioned influence and livelihood and vulnerability. The third sub-question is about the different responses of small businesses, distinguishing ex-ante and

ex-post measures; namely avoiding flooding and coping with flooding. These different responses have to be captured accurately in order to be able to find out if the small businesses are responding to flooding and in what ways. Once that is clear, the effect of flooding on small businesses can be linked to these responses. These three sub-questions lead to the fourth sub-question; how respondents foresee the future with their businesses. This question is necessary because it will become clear to what extent the business owners foresee future problems for their businesses. All four sub-questions are descriptive, while they describe the current situation rather than explain how this situation came to be.

1.4 Research framework

This research will be divided into various steps (see figure 4) to create a logical research structure. The first step is to do a literature review and obtain insight in theoretical literature to create a theoretical base (A). This means finding out what already is known in general about the concepts of different responses, livelihood, and vulnerability, but also apply these theories on small enterprises. Furthermore, this step is to identify relevant theories and central dimensions that could help to answer the research question and the sub-questions. The operationalization of the different concepts will lead to interview questions. The next step (B) is to do observations that will help with the analysis of the results and conduct interviews. Research will be done, on the one hand, over the general concept of responses, livelihood, and vulnerability and on the other hand, the focus will be on a flood prone area in the city of Semarang. By conduction and analyzing interviews (C), the position of the small enterprises will get clear and answers to the research questions will be found. Eventually, this will result in (D) conclusions about the different responses, livelihood and vulnerability of small enterprises in the flood prone area of Tambak Lorok and possible recommendations for further research.

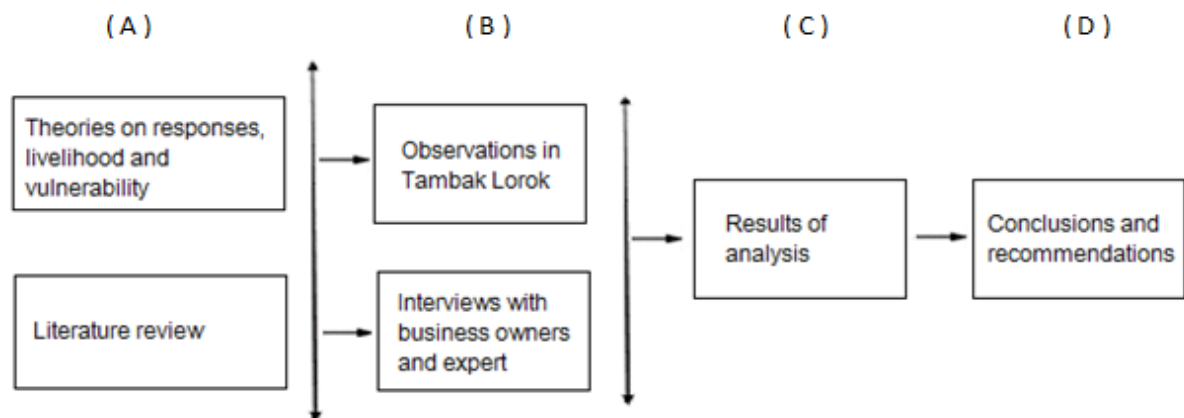


Figure 4: Research model

It is of importance to keep in mind that research is an iterative process (Verschuren & Doorewaard, 2007). Although different parts of the model refer to a particular segment it is important that the model should not be seen as a fixed research planning. Going back and forth between the different steps thus happened a lot. For example, after the first time visiting Tambak Lorok it was needed to change some interview questions and add some others, causing the theories to change a bit too. This model is thus only a guide for the research process.

2. Theoretical framework

“The choice to 'do nothing' in response to the mounting evidence is actually a choice to continue and even accelerate the reckless environmental destruction that is creating the catastrophe at hand.” - Al Gore, 2006.

Is what Al Gore said in his book “Earth at Balance: Ecology and the Human Spirit” (2006). And although this is quite a violent statement he is certainly correct about one thing: doing nothing is a response people are able to choose regarding climate change.

When looking at climate change and specifically at the flooding that is caused by this, the small businesses of Semarang could respond in three different ways to the tidal flooding occurring in their neighborhood. This research thus focusses on which types of response is used by the shop owners of Semarang. This is important so that institutions and governments are able to adjust their policy to ensure that it fits well with the way small businesses react to flooding.

2.1 Different responses

The three ways of response used in this research are mitigation, adaptation and non-response. Adaptation is a process where individuals and communities seek to reduce vulnerability to enhance resilience in response to observed and expected changes due to climate change (Harwitasari & van Ast, 2011; McCarthy et al., 2001; Adger et al., 2007). Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters (FEMA, 2018), or in other words: the action to minimize the impact of a potential disaster (Twigg, 2004). Lowe and Tol argue that adaptation and mitigation need to be considered together when addressing the consequences of climate change for coastal areas (IPCC, 2007). Collectively the interventions done through adaptation and mitigation can provide a more robust response to human-induced climate change than consideration of each policy alone (IPCC, 2007). While mitigation removes resources from adaptation and benefits are not an immediate investment in adaptation it may appear preferable, especially in developing countries (IPCC, 2007; Stern, 2007). Non-response is a refusal or failure to respond, or the lack of response (Merriam-webster, 2018).

For this research, it is important to find out which way of responding is used when coping with flooding. Finding out in which ways the small businesses respond to the flooding can help to inform the government in which ways they can actually help and support the inhabitants. The inhabitants, who have lived for years in these circumstances, can be a good example for future improvements. This could lead to more specific solutions too.

2.1.1. Adaptation

Adaptation refers to adjustments in ecological, social, or economic systems to reduce vulnerability or enhance resilience in response to actual or expected climatic changes, their effects or impacts and associated extreme weather events (Adger et al., n.d.). It involves changes in social and environmental processes, perceptions of climate risk, practices and functions to reduce potential damages or to realize new opportunities (Adger et al., n.d.). Adaptations include anticipatory and reactive actions, private and public initiatives and can relate to projected changes in temperature and current climate variations and extremes that may be altered with climate change (Adger et al., n.d.). Adaptation measures can be reactive or proactive. Reactive means that the adaptation measures are responding to the impacts as they occur while proactive means that they are implemented in advance to reduce future climate risk and vulnerability (Harwitasari & van Ast, 2011; Smit & Pilifosofa, 2001). Adaptation can also be differentiated into autonomous adaptation and planned adaptation. While autonomous adaptation refers to unmanaged actions and thus without any interventions from government, planned adaptation refers to adaptation as a part of climate change response strategy by governments (Harwitasari & van Ast, 2011; Munasinghe and Swart, 2005). Autonomous adaptation measures are based on initiatives from the private sector, mostly triggered by marked and welfare changes (Harwitasari & van Ast, 2011). Pottock

and Jones (2000) state that planned adaptation consists of nonphysical measures like writing, talking, education and raising awareness. Together this will eventually lead to real actions in the field (Harwitasari & van Ast, 2011).

While all societies have inherent abilities to deal with certain variation in climate, adaptive capacities are unevenly distributed across countries and within societies (Adger et al., n.d.). Historically, the poor and marginalized have been most at risk and are most vulnerable to the impacts of climate change (Adger et al., n.d.). Adaptations include anticipatory and reactive actions, private and public initiatives, and can relate to projected changes in temperature and current climate variations and extremes that may be altered with climate change. In practice, adaptations tend to be on-going processes, reflecting many factors or stresses, rather than discrete measures to address climate change specifically (Adger et al., n.d.).

Autonomous adaption processes are unlikely to be sufficient to respond to sea-level rise in the coastal zone of Semarang, given that the large concentration of people and activity is still growing (Nicholls, 2002). Planned adaptation options to sea-level rise are usually presented as one of these following generic approaches, according to Nicholls (2002):

- (Planned) retreat – all natural system effects are allowed to occur and human impacts are minimized by pulling back from the coast;
- Accommodation – all natural system effects are allowed to occur and human impacts are minimalized by adjusting human use of the coastal zone;
- Protection – natural system effects are controlled by soft or hard engineering, reducing human impacts in the zone that would be impacted without protection.

For this research, it is important to find out if respondents are using any of these above-mentioned forms of either planned adaptation or another form of adaption. This could help explain the behaviour of small businesses in times of flooding. Finding out how they respond can lead to more specific solutions too.

2.1.2. Mitigation

FEMA (Federal Emergency Management Agency) states that effective mitigation efforts are able to break the cycle of disaster damage, reconstruction, and repeated damage (2018). It reduces future risks in the longer term (IPCC, 2007). Mitigation can take place before, during or after a disaster, although the term is most often used to refer to actions against potential disasters (Twigg, 2004). Mitigation measures are both physical or structural and non-structural (Twigg, 2004). Structural measures are things like flood defenses and strengthening buildings, while non-structural means things like training in disaster management, regulating land use and public education (Twigg, 2004).

2.1.3. Non-response

While non-response in quantitative research could mean that there was a failure to obtain a measurement on one or more study variables for one or more elements selected for the survey (OECD, 2013), this research will not use that definition. This definition is not suitable for qualitative research, so another definition is used. Non-response in this research will say that although inhabitants maybe know flooding is a problem and that it should be addressed, they don't because it is not on top of their priority list. It could be that the daily life with the daily struggles they face is more prioritized than the need to be protected from the flood.

It is important to include this type of response into this research because it is uncertain if all the small businesses in Semarang are able to respond to flooding with adaptation or mitigation. By including this third form of response this research makes sure that all possibilities have been made clear.

2.3 Livelihoods

Coastal communities invariably depend on their livelihood from ecosystem services (Jayanti et al, 2018). “Making a living”, “supporting a family” or “a job” all describe a livelihood. The term is well recognized as humans inherently develop and implement strategies to ensure their survival (Hertz et al., n.d.). But the complexity behind the term livelihood comes to light when governments, civil society, and external organizations attempt to assist people whose means of making a living is threatened, damaged or destroyed (Hertz et al., n.d.).

This research will use the definition of livelihood as explained by Chambers and Conroy (1991):

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

The way a household copes with and withstands economic shocks depends on the options available in terms of capabilities, assets, and activities, that is to say, on the household livelihood strategy (Alinovi et al., 2010).

Livelihood strategies comprise the range and combination of activities and choices that people make or undertake in order to achieve their livelihood goals (GLOPP, 2008). There is an enormous range of strategies to choose from. An individual may take on several activities to meet his needs, while one or many individuals may engage in activities that contribute to a collective livelihood strategy (Hertz et al., n.d.). Within households, individuals often take on different responsibilities to enable the sustenance and growth of the family (Hertz et al., n.d.). Another characteristic of livelihoods is their interdependence (Hertz et al., n.d.). Not many livelihoods exist in isolation, but many livelihoods rely on other livelihoods to access and exchange assets (Hertz et al., n.d.).

Livelihoods are also shaped by the changing natural environment (Hertz et al., n.d.). The quality of soil, air and water; the climatic and geographic conditions; the availability of fauna and flora; and the frequency and intensity of natural hazards all influence livelihood decisions (Hertz et al., n.d.). Traders rely on farmers to produce goods, they rely on processors to prepare them and they rely on consumers to buy them. Livelihoods also compete with each other for access to assets and markets. Thus positive and negative impacts on a given livelihood will, in turn, impact others (Hertz et al., n.d.). But the strength of a given livelihood is not only measured by its productive outcomes but equally by its resilience to shocks, seasonal changes, and trends (Hertz et al., n.d.). Shocks can include natural disasters, wars, and economic downturn. Availability of resources, income-generating opportunities, and demand for certain products and services may fluctuate seasonally (Hertz et al., n.d.). More gradually and often predictable different trends in politics and governance, in technology use, economics and availability of natural resources can cause serious obstacles to the future of many livelihoods (Hertz et al., n.d.). All these changes can impact the availability of assets and the opportunities to transform those assets into a “living”, and under such conditions, people must adapt existing strategies or develop new strategies in order to survive (Hertz et al., n.d.).

Although there are a lot of livelihood strategies to choose from, as mentioned above, this research will focus on the sustainable livelihoods approach and the livelihood security approach because both approaches seem to have a lot in common with the community of Tambak Lorok. Both these approaches focus on the micro-entrepreneurships in Tambak Lorok because this research focusses on small businesses with owners who keep their businesses at a scale they are able to manage themselves (Torregrossa, 2016). Micro-entrepreneurships are defined as those having fixed capital or a number of workers under certain threshold levels (Bhattacharya & Londhe, 2014). Most important to keep in mind

during this research is, first, that these businesses do not have the intention to hire employees and/or to grow into a larger company (Torregrossa, 2016). Secondly, they are able to trade immediately without needing infrastructures, any funding or a business plan and they often learn business skills as they go (Torregrossa, 2016). Third, they measure growth in unconventional ways, balancing income generation with business autonomy, flexibility, long term self-reliance and personal well-being (Torregrossa, 2016). During this research it is important to keep in mind that there is a relation between this kind of entrepreneurship and livelihood assets (Kabir et al., 2012).

2.3.1 Sustainable Livelihoods Approach

The livelihoods approach is first and foremost concerned with people and thus seeks to gain an accurate and realistic understanding of people's strengths, called 'assets' or 'capitals' GLOPP (Globalisation and Livelihood Options of People living in Poverty) says (2008). These assets where livelihood consists of can be tangible, such as food stores and cash savings, trees, land, livestock, tools and other resources. Or they can be intangible, such as claims one can make for food, work, as well as access to materials, information, education, health services and employment opportunities (Hertz et al., n.d.). But another way to understand assets of a livelihood that people draw upon to make a living is to categorize them into five groups: human, social, natural, physical, financial and political capitals (Hertz et al., n.d.), as can be seen in figure 5. DFID stresses that these five categories are of great importance to livelihoods, but it also stresses the need to maintain an 'outcome focus' (Carney et al., 1999).

<i>Human capital:</i>	Skills, knowledge, health and ability to work
<i>Social capital:</i>	Social resources, including informal networks, membership of formalized groups and relationships of trust that facilitate co-operation and economic opportunities
<i>Natural capital:</i>	Natural resources such as land, soil, water, forests and fisheries
<i>Physical capital:</i>	Basic infrastructure, such as roads, water & sanitation, schools, ICT; and producer goods, including tools, livestock and equipment
<i>Financial capital:</i>	Financial resources including savings, credit, and income from employment, trade and remittances

Figure 5: Livelihood Assets [Eldis] – Livelihoods Connect. Retrieved from https://www.unisdr.org/files/16771_16771guidancenoteonrecoveryliveliho.pdf

The first step of a development project based on the Sustainable Livelihoods Approach is to do a detailed investigation of the living conditions of the target population (GLOPP, 2008). Going to Tambak Lorok and interviewing small businesses about their conditions will help to gather this information. The second step is to identify limiting factors, which hinder the adaptation of sustainable livelihood strategies on the one hand and recognize the factors that reduce vulnerability on the other (GLOPP, 2008). By interviewing and observing the community in Tambak Lorok these limiting factors should become clear. The project outlined takes the limiting factors into account and tries to eliminate them by relying on the available assets and strength of the target group (GLOPP, 2008). Before the planning gets implemented the framework should be used to anticipate the effects of the project activities, including possible side effects on other population groups (Kollmair & Gamper, 2002).

In an attempt to better understand how people develop and maintain livelihoods the UK Department for International Development (DFID) developed the Sustainable Livelihoods Framework (SLF) (Hertz, n.d.). It is an analysis tool, useful for understanding the many factors that affect a person's livelihood and how those factors interact with each other (Hertz, n.d.) and is the core of the Sustainable Livelihoods Approach

(GLOPP, 2008). By conducting livelihood analysis, the first step to understanding the livelihoods of the poor is undertaken (GLOPP, 2008). This analysis will be the basis for planning, prioritizing and eventual monitoring, and while there are no particular tools for such analysis, the DFID has made the SLF that provides an organizing structure for this analysis (GLOPP, 2008). The Framework can be understood as a tool or checklist to understand poverty in responding to poor people's views and their own understanding of poverty, GLOPP says (2008). The DFID framework sets out to conceptualize:

- how people operate within a vulnerability context that is shaped by different factors – shifting seasonal constraints (and opportunities), economic shocks and longer-term trends
- how they draw on different types of livelihood assets or capitals in different combinations which are influenced by:
 - the vulnerability context
 - a range of institutions and processes
 - how they use their asset base to develop a range of livelihoods strategies to achieve desired livelihood outcomes (de Stagé et al., 2002)

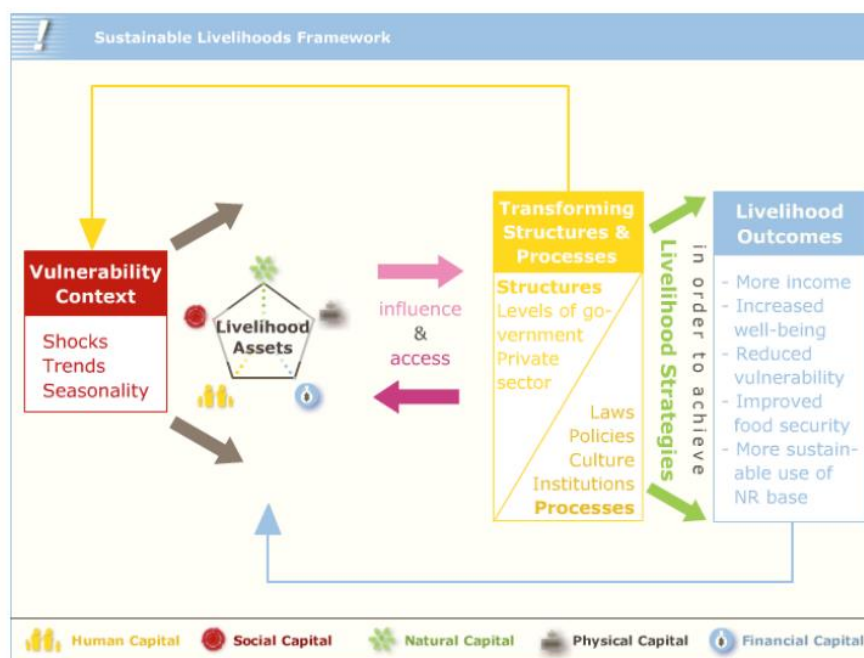


Figure 6: Sustainable Livelihoods Framework [DFID]. Retrieved from http://www.glopp.ch/B7/en/multimedia/B7_1_pdf2.pdf

According to GLOPP (2008), the main elements of the framework can be summarized as follows, as stated by Kollmair and Gamper (2002):

The framework depicts stakeholders as operating in a context of vulnerability, within which they have access to certain assets. Assets gain weight and value through the prevailing social, institutional and organizational environment (policies, institutions and processes). This context decisively shapes the livelihood strategies that are open to people in pursuit of their self-defined beneficial livelihood outcomes.

During the research in Tambak Lorok, this framework will be kept in mind. By using the framework as a guideline, it can be determined how better livelihood outcomes can be achieved and through which livelihood assets.

2.3.2. Livelihood Security Approach

Livelihood security approaches have evolved from thinking about the root causes of food insecurity (Concern, 2004). Livelihood security is defined as the adequate and sustainable access to income and resources to meet basic needs (including adequate access to food, potable water, health facilities, educational opportunities, housing, time of community participation and social integration) (Frankenberger & McCaston, n.d.). Or, in other words, the options on how people and communities make a living are a function of their available resources and how their external environment influences them (Concern, 2004). Current environmental variability and consequent climate change are predicted to cause increasing global temperatures, changing weather, rising sea levels and more frequent and intense extreme weather events (Boko et al., 2007; Assan & Kumar, 2009). Assessments such as the IPCC assessments show that environmental conditions and climatic patterns are changing and directly affect the livelihoods of the poor and undermine the constituents and determinants of livelihood security (Boko et al. 2007; Bates et al., 2008; Assan & Kumar, 2009). The changing environment increases the flooding in Tambak Lorok which influences the livelihood of the inhabitants, which was already insecure. Hertz states, it is recognized that poor families commonly suffer more than one problem at a time and often have to make significant sacrifices to meet their basic needs (n.d.).

An effective strategy to transform insecure livelihoods into secure livelihoods is to simultaneously address three components – jobs, skills and safety nets (Gokarn, 2014). The first component is jobs, and most likely the creation of more jobs. By creating more jobs the livelihood of people will increase (Gokarn, 2014). Because more jobs means more money for the people in the community, and more money in the community means more money to spend within the community, for example in local shops. The second one, skills, is a huge challenge because although there are maybe more jobs created, it is of great importance that the workers have appropriate skills too (Gokarn, 2014). Gokarn states that there is very little livelihood security for people trained in a particular skill, who are displaced every few years by a new generation (2014). The third component, a safety net, is an unquestionable need according to Gokarn (2014). An economy whose competitive strength is based on the low cost of labor will inevitably find this strength being eroded if the employer is asked to pay the wage plus the entire cost of the safety net (Gokarn, 2014). Thus according to sustain a secure livelihood, Gokarn states that it is of great importance to address these three components simultaneously (2014). But these components are not the only thing needed for a secure livelihood.

According to Frankenberger and McCaston, each household can have a few different possible sources of entitlement which constitutes its livelihood (n.d.). The risk of livelihood failure determines the level of vulnerability of a household to income, food, health and nutritional insecurity (Frankenberger & McCaston, n.d.). Therefore, livelihoods are secure when household have secure ownership of, or access to, resources and income earning activities, including reserves and assets, to offset risks, ease shocks and meet contingencies (Frankenberger & McCaston, n.d.), something that could be applied to small businesses too.

2.4 Vulnerability

Humanity has long sought to explain and understand why environmental processes and phenomena contribute to and interfere with development and livelihoods processes including health, energy, food, and water (Kelman et al., 2016). In considering modern scientific thought and method, terms like 'vulnerability' are frequently employed, especially for examining disasters through a development lens (Kelman et al., 2016). In the 1980s the debate on vulnerability terminology began, focusing on three basic concepts: (1) related to the exposure (biophysical/technology), and (2) the consequences of the loss of social vulnerability or (3) a combination of both (Sariffuddin et al., 2017). This vulnerability research falls at least under three alternative categories: (1) exposure, this is the level of which an ecosystem is determined by environmental conditions (Jayanti, 2018), (2) adaptive capacity, this reflects people's ability to anticipate and respond to changes and to minimize, cope with and recover from the consequences of change (Jayanti, 2018), and (3) sensitivity which is the level of dependence on natural resources and the technologies used to harvest resources (Jayanti, 2018).

This research will keep these three alternative categories in mind while referring to vulnerability as the propensity of human and ecological systems to suffer harm and their ability to respond to stresses imposed as a result of climate change effects. The vulnerability of a society is influenced by its development path, physical exposures, the distribution of resources, prior stresses and social and government institutions (Kelly and Adger, 2000; Jones, 2001; Yohe and Tol, 2002; Turner et al., 2003; O'Brien et al., 2004; Smit and Wandel, 2006; Adger et al., n.d.) The commonplace meaning of vulnerability is "being prone to or susceptible to damage or injury" (Blaikie et al., 2004). But Blaikie et al. (2004) offers a simple working definition this research will use:

Vulnerability is the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process). It involves a combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk by a discrete and identifiable event in nature and in society.

Natural hazards appear to be directly linked to loss of life and damage to property, and there are social factors involved that cause peoples' vulnerability and can be traced back sometimes to quite 'remote' root and general causes. This vulnerability is generated by social, economic and political processes that influence how hazards affect people in varying ways and with different intensities (Blaikie et al., 2004). Some groups are more prone to damage, loss, and suffering in the context of differing hazards. Key variables explaining variations of impact include class (which includes differences in wealth), occupation, caste, ethnicity, gender, disability and health status, age and immigration status (whether 'legal' or 'illegal'), and the nature and extent of social networks (Blaikie et al., 2004). In this research the variables class, occupation and health status most likely play the biggest role.

Although vulnerability cannot be read directly off from poverty, the two are often very highly correlated (Blaikie et al., 2004). Reducing poor people's vulnerability in terms of exposure to risk may increase their propensity to engage in previously untested but more productive economic activities (Krantz, 2001). What is clear is that vulnerability involves varying magnitudes: some people experience higher levels than others (Blaikie et al., 2004). It is important to keep in mind that vulnerability can also be measured in terms of the damage to future livelihoods, and not just as what happens to life and property at the time of the hazard event (Blaikie et al., 2004). Vulnerable groups are also those that find it hardest to reconstruct their livelihoods following disaster, and this in turn makes them more vulnerable to the effects of subsequent hazard events (Blaikie et al., 2004). To find out if flooding influences the vulnerability of the small businesses it is important to find out if the community of Tambak Lorok is vulnerable.

2.5 Conceptual model

The theoretical background of the former paragraph is shown in the conceptual model in figure 7. The three most important concepts as identified in chapter 1 are the relations between livelihood, vulnerability and the different responses of respondents. The research questions ask about how the tidal flooding affects these two concepts, taking into account that different responses play a role too. Thus there are one-headed arrows from those two concepts towards the effect on small businesses representing their influence on small businesses. Flooding forms an independent factor in this conceptual model, influencing the two concepts of livelihood and vulnerability. Not only influence these two concepts the effect on small businesses but the effect on small businesses effects on its turn the response of these businesses. Not only influences the effect the response, but the response influences the livelihood and vulnerability as well because by responding differently the livelihood and vulnerability will change too.

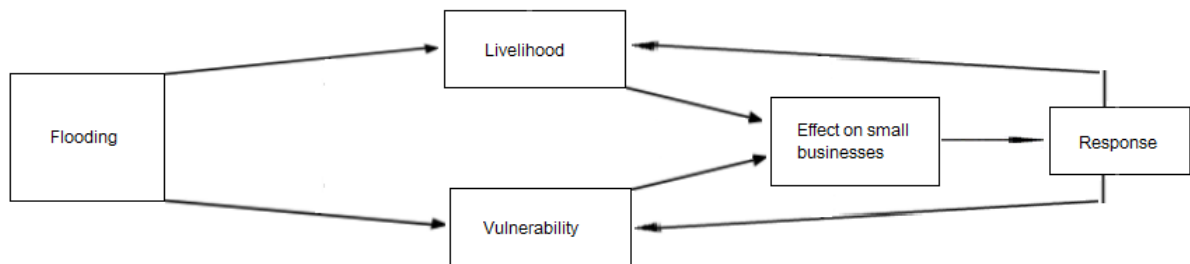


Figure 7: Conceptual model

2.5.1. Type of response

As mentioned in the theoretical framework this research will focus on three different ways of responding. Adaptation, mitigation, and non-response are three factors which are identified as types of response. These form the dimensions for the concept of response (see figure 8).

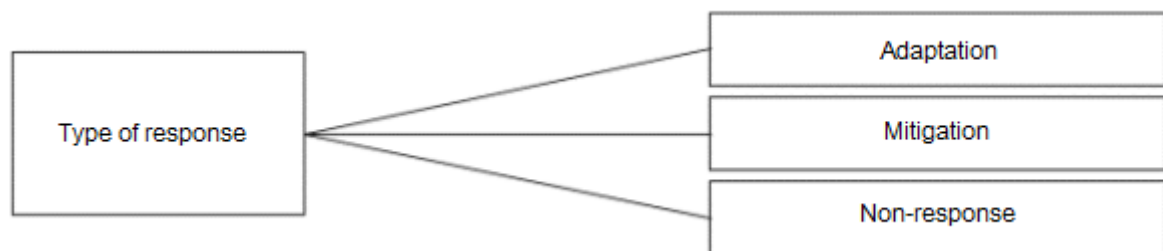


Figure 8: Type of response

While the types of response could be divided into three categories, adaptation will be divided in this research too. As chapter 2 set out adaptation can be divided into autonomous adaption and planned adaption. Different forms of this planned adaption could play a role in this research, as can be seen in figure 9. Planned adaption is further operationalized because this research will focus on this type of adaption, while autonomous adaption is, as said in the theoretical framework, unlikely to be sufficient to respond to sea-level rise in the coastal zone of Semarang (Nicholls, 2002).

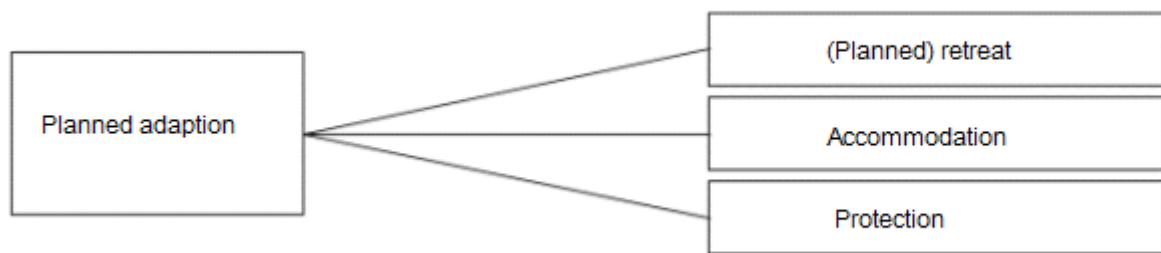


Figure 9: Planned adaption

Mitigation is another category of response used in this research and could be divided into physical or structural and non-structural, as can be seen in figure 10.



Figure 10: Mitigation

2.5.2. Livelihood

There are a lot of livelihood strategies to choose from, but this research will be limited to two approaches, namely the Sustainable Livelihoods Approach and the Livelihood Security Approach, both shown in figure 11.



Figure 11: Livelihood strategies

The Sustainable Livelihoods Approach can be divided into five groups, explained in figure 12. These five groups are the assets of a livelihood that people draw upon to make a living (Hertz et al., n.d.).

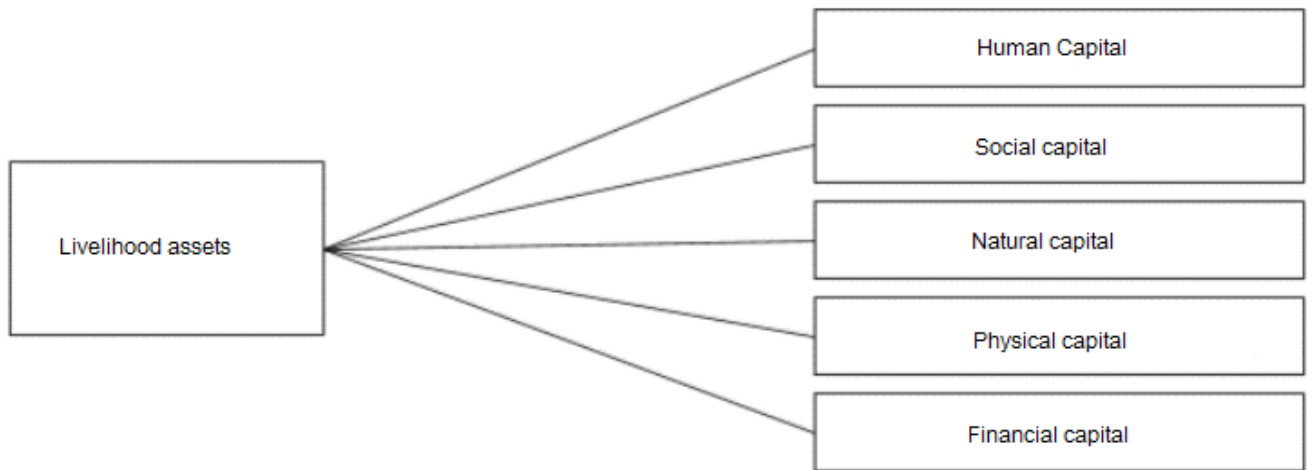


Figure 12: Livelihood assets

As the theoretical framework already pointed out when speaking of the Livelihood Security Approach there are three components that simultaneously need addressing when forming a strategy to transform insecure livelihoods to secure livelihoods (see figure 13) (Gokarn, 2014). This together with the theory of Frankenberger and McCaston (figure 14) forms the operationalization of secure livelihoods.

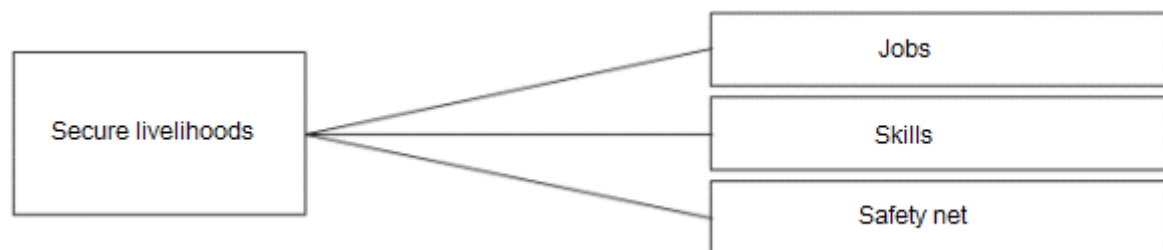


Figure 13: Secure livelihoods according to Gokarn

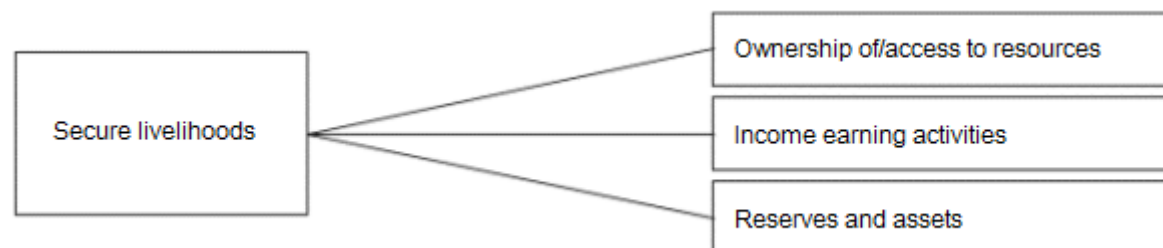


Figure 14: Secure livelihoods according to Frankenberger & McCaston

2.5.3. Vulnerability

As mentioned in the theoretical framework vulnerability falls at least under three categories (see figure 15).

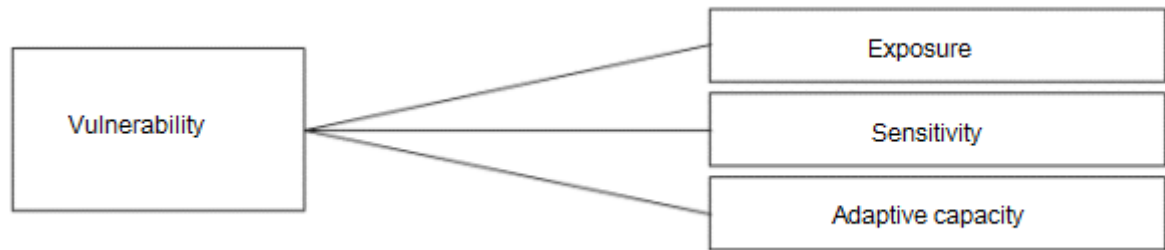


Figure 15: Vulnerability

3. Methodology

3.1 Research strategy

The aim of this research is to gain a better understanding of how floods affect the livelihood and vulnerability of small businesses in Tambak Lorok. This research started with a literature study to learn more about flooding in Semarang. Once arrived in Semarang the flood prone area Tambak Lorok was chosen because of a large number of small businesses which are located there and which have a high risk of flooding due to the danger of flooding in the area.

The theories about livelihood and vulnerability used in this research are complex and this research is focusing on a specific area, so in-depth examination is needed to describe it. While closed questions do not give the respondents the opportunity to express how they constructed or understood their experience, qualitative research creates in-depth responses which do (Jackson, Drummond & Camara, 2007). The focus thus turns to understanding human being's richly textured experiences and reflections about those experiences (Jackson, Drummond & Camara, 2007). Collecting qualitative data applies here, because of the explanatory approach that is used in this research. The explanatory approach is mostly used to find out what the background and causes of the explaining phenomenon are (Verschuren & Doorewaard, 2015 p. 108). This type of research is used to clarify how something came about (Verschuren & Doorewaard, 2015 p. 108).

It is important to guarantee the internal validity of the research as best as possible. This has been done in different ways. Triangulation was achieved by observing and interviewing experts and business owners. Also, the translator has been informed about the conclusions of the interviews so she could judge whether it was understood as she told. One of the challenges that could play a role during the research is the separation of relevant data (Xu, 2008), leading to incorrect conclusions. So attention was given to prevent this separation of data. The external validity of this research is limited because the respondents could have certain characteristics which are still unknown that influence how flooding affects their vulnerability and livelihood.

3.2 Research methods

To be able to answer the different sub-questions, data is needed. The data was collected through two different research methods. First, in-depth interviews were conducted and secondly an observation was done. While the interviews are the primary source of data, the observations support the interviews and are mostly used as background information. These observations thus fostered the internal validity of the research by triangulation, because as Creswell states, it is typically not enough when developing an in-depth understanding to rely on one source of data (Creswell, 2013).

The first time going to Tambak Lorok was to do a small pilot study to find out if the assumed problems were actually there. The assumed problems were mainly that the whole area flooded during high tide and/or heavy rainfall and caused a lot of trouble for small businesses. An employee of LPUBTN KAS joined us to show us around this area. Because he is involved with the plans of the government to transform the area of Tambak Lorok he knows a lot of inhabitants. We walked around in different parts of the neighborhood and talked to different people. From this pilot study it became clear there are differences between various parts of the area because of the pavement and drainage system that the government has constructed. This caused parts of the area to flood heavily while other parts endured a lot less flooding. While the employee of LPUBTN KAS knew a lot of people, he let me decide which respondents we would interview. In the first few interviews during the pilot study, the differences between the areas became clear. The second time visiting Tambak Lorok my translator and I focused on the group connected to the pavement and sewer to see if there was a difference between the respondents in this area as the circumstances were everywhere the same.

The respondents that were interviewed the second time in Tambak Lorok were chosen because of various reasons. Almost all the businesses are small places inside the homes of inhabitants where they sell their goods, it was not possible to know in advance where we would find which stores. Important to keep in mind was that the shops had to be location-bound and would thus struggle with potential moving. Furthermore, it was of importance that different kind of shops were interviewed, like shops selling goods, but also shops selling self-made food or shops selling drinks. Also a man who collects shells as a business was interviewed. Another condition the shops had to meet was that they were connected to the pavement and drainage system. Walking around, keeping these condition in mind, the different respondents were chosen.

My translator and I walked around together in the area of Tambak Lorok. While the employee of LPUBTN KAS joined us the first time and showed us around, were we on our own the second time. The employee explained what we saw and answered all my questions about the area. He took me to the part of Tambak Lorok where still was no drainage system yet, so I could compare it to the area with the drainage system. He explained the project of the government in which they build a public toilet and the drainage system. He showed us the location of these projects. The second time in Tambak Lorok my translator took me to the part of the area that is located directly next to the sea, and where a lot of houses are built on poles. She also showed me parts of the area where the drainage system was covered with pavement and parts where the drainage system was still open. This observation was very useful for my research.

For the interviews with the respondents, an interview guide was used. The sub-questions of this research have shaped this guide and the precise questions are based on the operationalization of the conceptual model. The interview guide is semi-structured to provide the freedom to go into depth, but to prevent the interview from being chaotic or wandering off from the questions that need to be answered. The interview guide exists of an introduction with some general information like the topic of the research. All respondents were asked for permission to record the interview. First, the respondents were asked to answer a few general questions about some personal information like how long they have been living in the area and how long they have owned the shop. After this some questions about their business related to flooding were asked to find out if their business floods during heavy rainfall. Then some questions related to the theory 'response' were asked, such as if they had already taken prevention measures for flooding and what they would do when their business faces flooding. Questions about vulnerability and livelihood were asked after this, for example if they experience discomfort during a flooding and if they would run their business differently if flooding was not an issue. Lastly, some questions about their future perspective were asked, for example if they think the tidal flooding will change in the next few years and if they would like to move out of the area.

The interview with the expert was conducted after the interview with the business owners. It was important to do this interview because of the different outlook these two kinds of respondents have on flooding. The expert interview was held with Mrs. Rini Sipil, an expert in climate adaptation strategy; specialized in infrastructure and coastal engineering. Together with her, data resulting from other interviews was reflected and some early conclusions were drawn together. For this expert interview there was an interview-guide to make sure all questions would be dealt with and to direct the interview a bit. Because of the broad knowledge of Mrs. Rini possesses, all of the unanswered questions got answered.

3.3 Data analysis

All four sub-questions are descriptive, while they describe the current situation rather than explain how this situation came to be, as mentioned above. These sub-questions are all analyzed using a phenomenological approach.

According to Creswell, phenomenology is an approach to qualitative research that focuses on the commonality of a lived experience within a particular group. The fundamental goal of the approach is to arrive at a description of the nature of the particular phenomenon (2013). In this case the respondents' vulnerability and livelihood. To understand what the actors experience and how they experience it, data from individuals is collected (Creswell, 2013). So, the approach takes the personal perspective of the actor as a starting point to explore a phenomenon experienced by all the actors; livelihood and vulnerability. The four sub-questions all describe the experiences of participants, rather than explaining it (Creswell, 2013). Although in this type of phenomenology it is tried to set aside the experiences of the researcher in order to start with a fresh perspective, it is important to acknowledge that the process of discovering the universal essence of the experiences of individuals is strongly related to the interpretation of the different individuals (Creswell 2013). It is tried to describe the phenomenon of vulnerability and livelihood and the respondents' response on flooding by seeking common experiences among the respondents.

3.4 Reflection on research methodology

To be able to collect the right information for answering the research questions respondents were needed first. Because the inhabitants of Tambak Lorok usually don't speak English, there is made use of a translator. The first time I went to Tambak Lorok translator Rena joined me. She is an architectural student from UNIKA. But because Rena got sick the second time I went to Tambak Lorok I went with Valerie, also an architectural student and a good friend of Rena. Both the translators had never been in Tambak Lorok before. Before going to Tambak Lorok to conduct interviews, the interview guide was discussed with both translators to see if everything was clear and they understood what kind of information was needed. This was necessary because they would speak Indonesian with the respondents and it was thus not possible for me to understand if they were translating the questions correctly.

New questions came up after every answer whenever it was possibly relevant. Often was asked how and why it is what the respondents answered to gain a better sense of their experiences. The interview guide proved to be useful during interviews for me, but for my translators too. Although the translating made me dependent on the correct interpretation of the translators, they were really helpful and thoughtful. Sometimes they asked the respondents more questions to provide me with a more wholesome answer. Almost every interview gave new insights and achieving it on my own would have been impossible.

The specific methods used do not only provide a lot of information, they also have their specific traps. With the interviews being done one-on-one, there is a danger of gathering not enough data because the respondent could not be feeling at ease, the respondents maybe feel restrained or could not be answering truthfully because they maybe feel like the interviewer or translator is judging them. It maybe did not help that the respondents were interviewed by a foreigner who they did not know and is really different from them. To try and prevent this from happening as much as we could we tried to make the respondents at ease by telling them there was no wrong answer and by not asking them for their name so they could remain anonymous. Notes were taken and questions were formulated as simple as possible.

4. Tambak Lorok in a nutshell

The first time I went to Tambak Lorok I looked around in wonder as the houses passed me by. I was sitting in the car of our translator and we were driving over a sand road full of bumps. Everywhere I looked I saw animals walking around, children playing and people working. Once we parked the car on the side of the road and opened the doors, the smell of rotting trash mixed with fish overwhelmed us. The heat was stifling and the sun burned on my with sunscreen soaked skin. After the first few steps outside of the car my translator prevented me from stepping in some mud, a phenomenon I thought I would not see in such a seemingly dry area. While I knew it was a flood prone area, I still did not expect it. Tambak Lorok inhabits a lot of fishermen, so the smell of fish was not really a surprise. What did surprise me was the overwhelming smell of trash. Not long after our arrival, I found out where that intense smell came from, everywhere around me lied piles and piles of trash. Tambak Lorok was nothing like I imagined and it was certainly nothing like I had ever seen before.

4.1. Description of Tambak Lorok

Kampung Tambak Lorok is located in Tanjungmas District, a North sub-district of Semarang. Tambak Lorok is one of the coastal villages in Semarang which is located on the edge of the East Flood Canal and Banger River, making it a place where a lot of fishermen live who depend on the sea. It has a total area of 46,8 hectares with a height of 0,5 meter above sea level, but with a land subsidence of 9-10 centimeter per year. The district is divided in a part with a pavement and drainage system and a part without pavement or an asphalted road and drainage system. The pavement and drainage system is part of a project to renovate Tambak Lorok. Although the drainage system should help prevent flooding in this area, often the system, especially where the drainage system is not covered, is used to dump trash. The land subsidence keeps lowering the ground in Tambak Lorok, so the floods both by tide and heavy rainfall keep occurring, but not in all places in Tambak Lorok alike. Some inhabitants mention they are getting worse and some inhabitants mention that the tidal flooding does not occur anymore because of the drainage system, but the flood caused by heavy rainfall is. Others say they never flooded in the first place. This research focused on the flood by tide causing a lot of problems for the small businesses in this area. Although the community leader said they try to prevent the trash from being thrown away by educating them and giving them containers, a lot of trash is still being thrown away. They throw the trash in the drainage system, the sea or on the fallow ground in between houses.

The land use of Tambak Lorok is divided into 32,4 hectares of settlements, 3,2 hectares of harbor area and 11,2 hectares of pond (use). The existence of fishing settlement is closely related to fishing resources, catchment areas and coastal areas, where the beaches are easily accessible by the public with good transportation and road network systems. In figure 16 is the location of Semarang and Tambak Lorok shown.

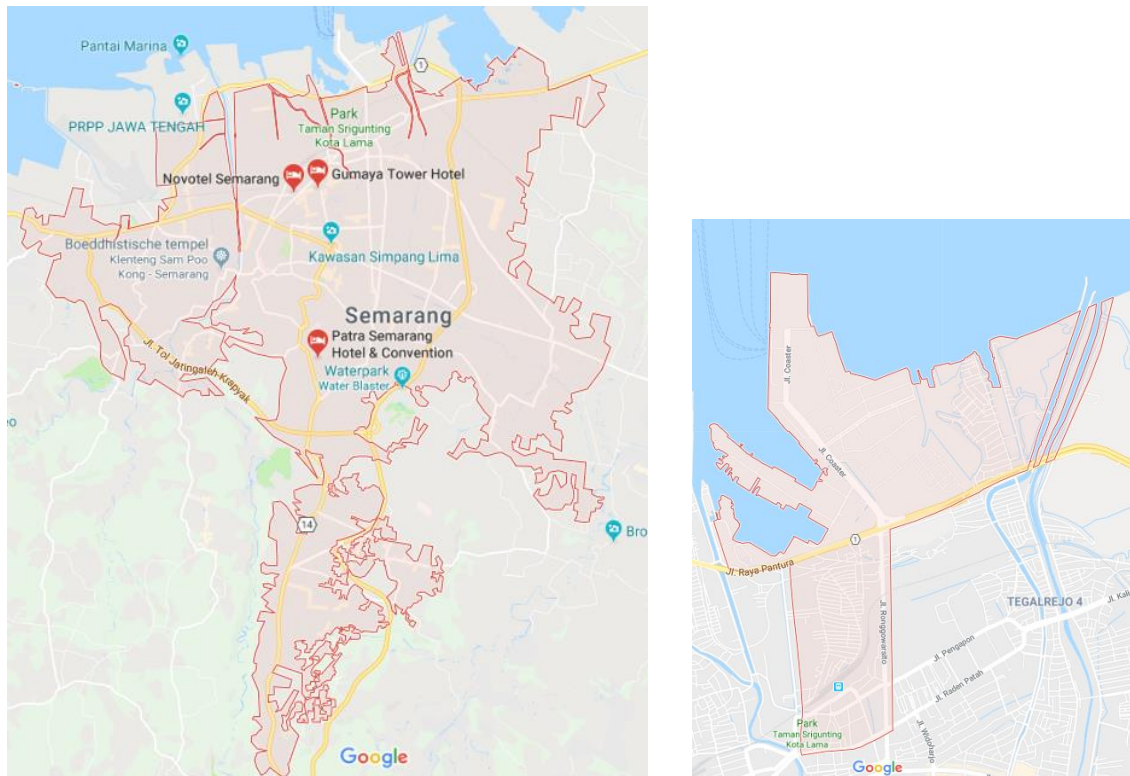


Figure 16: Location of Semarang (left) and Tambak Lorok (right) (Google Maps)

In 2016 the population of Tambak Lorok consisted of 30.678 people. Of this total population, 14.424 inhabitants are males and 16.251 inhabitants are females. 750 people per hectare live in the village part seen as slum and the number of poor families reached 970. Tambak Lorok contributes 36.02% of the poverty in Tanjung Mas Village. Tambak Lorok thus seems to be a mix of the poorest people and less poor people. While some houses are on groundwater level, others were able to level their houses up. Lastly, since the 1970s the character of the region has begun to change. Although new industries began to grow in the vicinity of Tambak Lorok in that decade, a lot of people still were fishermen. Fishing is divided into three typologies: fishing fisherman, fisherman workers, and fisherman boat rental service providers. While the residents that do something else consist of workers, employees, and traders. Broadly speaking, the distribution of typology of people in northern Lorok pond area, dead edge and the beach is inhabited by fisherman, while the southern and central part is inhabited by residents that are workers, employees and traders. In addition to fishermen and sellers of fresh fish, processed fish and laborers, a lot of residents in the area work as a trader. This can be seen from the number of people who trade in the market or open a shop in their houses.

Most of the people in Tambak Lorok are migrants whose parents or grandparents came to Tambak Lorok long ago. Initially, these people moved to this area in order to get a better livelihood, but due to limited quality and inadequate capabilities in employment, the residents chose to work as fishermen and laborers. They chose nonetheless to stay in Tambak Lorok although the conditions there are not feasible for settlements due to for example the land subsidence combined with the flooding. The residents stay in Tambak Lorok due to economic limitations, often they don't have the money to move, and close physical relationships with their livelihoods. The state of the poverty level in Tambak Lorok is exacerbated by environmental conditions which are not feasible because of crime. Most of the settlements lie lower than the tidal flooding level and the cost of repairs after flooding are very high while the income of most residents is low, causing difficult economic conditions. A lot of Tambak Loroks inhabitants are unemployed, which will further increase the level of crime rate in the area because of the high living needs, caused by the need to level up their houses to protect themselves from the flood, while the minimum income stays the same. The high levels of poverty can certainly lead to problems such as poor

environmental quality both physically and socially. Physically because people with high poverty levels tend to pay less attention to environmental quality such as garbage disposal, causing, for example, a blockage in the drainage system. This again adversely affects the health of the people because high levels of pollution can cause various diseases. Socially, this high level of poverty can lead to an increased crime rate.

4.2 Causes and effects

When my translator and I visited Tambak Lorok it soon became clear that most of the businesses are a part of the houses of shop owners. Every shop we visited had this combination of being a shop and a home at the same time. During the pilot study and the first time going to the area, we visited a few small businesses who were not connected to the pavement or drainage system. They told us that their house and shop flood frequently, sometimes up to 50 centimeters and up to three times a week, especially during the rainy season. One respondent tried to build a 'sabuk pantai' meaning something like a beach belt. This dam made of sand did not work, she said. They all use bricks to level up their furniture and electronics to prevent them from getting wet. All the respondents we spoke to said that they are not able to predict the flooding. One respondent told us that in his perception the ground sinks up to thirty centimeters each year, but he was not sure what caused it.

This subduction is the main reason why some parts flood so often. This flooding caused the government to build a drainage system on the sides of the road in parts of the area to prevent the sea water to flow into the houses. While the government heightens the pavements to prevent flooding, the people have to level up their houses themselves, explained translators Rena and Valerie. The influence of the subsidence along with the heightening of the roads got very clear when Rena and Valerie both pointed out abandoned houses (figure 17). Because of the land subsidence over the years and the heightening of the houses and roads surrounding them, these houses sunk so low that the water now almost comes up until the roof. They told me that the people who used to live there moved because they could not pay for the heightening of their home anymore, making the home unlivable. Other residents told us that they dump the trash on the fallow ground in between houses (see figure 18) so they can build their house on top of it. The trash serves as a cheap foundation for the house.



Figure 17: Sunken house



Figure 18: Fallow ground full of trash

The business owners of Tambak Lorok see the heightening of their houses and shops as one of the few solutions for flooding. Almost every resident we spoke to said that they do not have the money, knowledge or power to prevent tidal flooding. Almost all residents just wait until the water lowers again after their home flooded. Only one respondent told us that she has a small pump to prevent flooding but she said that she can only use it when the water is already inside. We asked the respondents if they wanted to move because of flooding. While some respondents want to they told us that they do not have the money. Almost all the money they earn goes to the heightening of their houses to prevent flooding. Other respondents said they don't want to move because of the life they have built up. The shop owners said their customers and the connections they gained over the years make them want to stay. Moving would mean having to start building a clientele all over again. Two respondents think that flooding did not really change over time, while others think it got worse. It is difficult to estimate whether this is due to the location of the houses of these respondents or due to, for example, their perception of flooding or the deterioration of this. All respondents except one think that the sewer is a good long-term solution and they do feel safe because of it. Only two respondents think that the sewer makes flooding worse or that the sewer does not make a lot of difference. The respondent who thought the sewer does not make a lot of difference told us that he does not care much about flooding or the solutions for it, because it does not really influence his daily life.

In the next paragraph, the results will be discussed while using the concepts from chapter two. The different responses inhabitants' have to flooding is affecting the livelihood and vulnerability, and will be discussed now.

4.3 The impact of flooding

4.3.1. Responses

The subduction of the land, the tide, and the rainfall are seen as the three main reasons the area of Tambak Lorok floods. Some respondents also pointed out that the trash in the drainage system could be a reason too. They said that the trash clogs the drainage system making it harder for the water to flow through and increasing the chance of overflow of the system, causing flooding. Although a lot of trash is dumped into the drainage system, it does help prevent flooding. The respondents whose shop is not connected to the drainage system are much more affected by the floods than the respondents who are connected to the drainage system. Respondents who are not connected to the system talk about flooding up until three times a week, while respondents connected to the drainage system say their home and shop almost never gets flooded anymore. They add that they only face floods once in a while when they are faces with heavy rainfall. According to Marfai et al., the community of Semarang manages the method of adaptation themselves. Typical responses ranged from 'doing nothing' to installing a variety of structural devices for combating flood (2007), something that became clear during the interviews too. All respondents, excluding one or two, do nothing when the water comes flooding into their homes and shops. They just heighten their electric devices on bricks so they don't get wet and wait until the water lowers again. When the water is low enough, they hose the water out with cups and trays of all sorts. Only one respondent made a small dike of sand and one respondent bought a pump to pump the water out, but both mentioned that it did not work for the prevention of flooding. Out of the interviews, it became clear that the respondents are getting used to the flood and that they do not care so much about it anymore. According to the expert, everything that is happening in the area does not bother them and it does not make them want to move. This has two main reasons, the first reason is that the people do not think the flooding is a big problem, they have adapted to the fact that their homes and shops flood and they are living their lives as usual, and second is that they love their homeland and thus want to stay where they are.

As mentioned above, all respondents heighten their houses to adapt to the flooding. Marfai et al. states that this way of constructing their houses is a socioeconomic characteristic of the local community and is

one of the key factor influencing the mitigation action regarding coastal hazard (2007). When asked who is responsible for the prevention of flooding half of the respondents think it is the government, while the other half thinks it is the community's responsibility. The expert also mentioned that some of the inhabitants are motivated to adapt to the situation, but that it takes time to get everyone involved.

4.3.2. Livelihood

All the shop owners we spoke to, except for two, were women. They all said that their husbands were fisherman for a living and that the women run the shop for some extra income. In some cases this was needed because they have children who still go to school, but in all of the cases have another reason. Namely that every year the coastal communities of Semarang allocate their savings to increase the height of their houses (Semarang City Government, 2016). Without this heightening of their houses they would not be able to keep living in their home and keep their business, the shop owners said. As mentioned above the respondents said they don't want to move because they (1) do not think flooding is such a big problem and they adapted to the situation and (2) they are too attached to the area and thus do not want to leave. But there is a third reason, namely that a lot of money they earn is invested in the heightening of their homes. This has not only caused an empty savings account and thus no money to move but also an investment in their homes and shops that is too big to just leave behind. One respondent mentioned that she would like to move, but only if the government makes her, so she can get some compensation money. Otherwise, it would be too expensive.

During the interviews, it became clear that all the shops have their regular customers who come and buy provisions or self-made food. This ensures the continued existence of all the small shops in the area because every shop supports another shop by buying their goods. It has also become clear that the flood does have a big influence on the income of these shops. As mentioned before, people stay away during or after the flood. All of these reasons influence if they are able to make a living. The frequency and intensity of this flood influences livelihood decisions as well. Although the shops that are connected to the drainage system experienced less flooding it still is a daily struggle they have to take into account.

By opening a shop, all the women whose man is fisherman, created more jobs, which is one of the components to create a secure livelihood. Although there are a lot of jobs created this way, there are no particular new skills needed for it. In other professions this could lead to being displaced by someone who has particular skills, but this does not apply to the shop owners in Tambak Lorok because all the shops support each other. So, there is little chance the shop goes bankrupt. There is also nothing like a safety net because all these women are their own boss. To create a secure livelihood all three of these components should be addressed, which is not the case in Tambak Lorok. Thus the livelihood of small business owners can be seen as insecure livelihoods. While the floods are influencing the income, health and security of households and can therefore be seen as livelihood failure, this all is causing a certain level of vulnerability. Because of the risk of livelihood failure, the level of vulnerability is maintained (Frankenberger & McCaston, n.d.).

4.3.3. Vulnerability

The livelihood failure is causing a certain level of vulnerability. Thus, Tambak Lorok can be categorized as a vulnerable community. They just recognize the changing environment as an exposure, yet cannot compromise the changing (Jayanti, 2018). When asked if the respondents knew what caused this change in the environment and causing flooding to get worse, none of the respondents had an answer. One respondent thought that flooding only seemed worse because of the land subsidence but none of the respondents thought this could have anything to do with climate change. One of the respondents stated that she did not think their way of living affects the yearly increasing CO² gas emissions (Febriani et al., 2018). But when looking at their habits, it can be concluded that due to the great use of scooters and cars, and the dumping and burning of trash, they actually do influenced this change in climate.

All respondents, except for one, think there is no positive side to flooding. It makes their houses dirty with salt water, which they have to clean with fresh water; the water smells and gives them itchy feet; the water ruins their furniture and electronics and makes their wares go bad. On top of this, flooding has an impact on their income too. Fewer people come to their shops during the flood and some customers stay away after the flood because they think the food that is prepared or the goods that are sold are dirty. The respondent who says the floods have a positive side thinks so because she collects waste that the flood brings, like water bottles which she can sell again. Other respondents specifically say that they are fisherman or shop owners and not scavengers, so they do not collect the trash and thus do not benefit from it.

When looking at the exposure to vulnerability it becomes clear that the ecosystem of Tambak Lorok is greatly determined by the environmental conditions. Flooding has a great influence on the daily lives of the inhabitants of Tambak Lorok and thus on the small businesses and their owners. The shops are all attached to the homes of the shop owners and are not movable, which means that not only the homes of the inhabitants of Tambak Lorok are very vulnerable for the flooding, but their shops are too.

The damage floods have on future livelihoods can be seen when asking the business owners about their future perspective. In the next paragraph this will be explained further.

4.4. Future perspective

Although the ground in Tambak Lorok keeps lowering because of land subsidence and the floods keep occurring as a result of the effects of climate change, most of the business owners still want to stay where they are. According to the expert, some land will in the future vanish into the sea due to abrasion. This has already occurred in other areas where some people lost half of their houses due to the water. Both the respondents and the expert stated that the small business owners do not think the tidal flooding is a big problem, because they have adapted to the situation. Although all the respondents think the flooding has gotten worse over the last couple of years and most of them think this will continue to become even worse in the future, they believe that the drainage system will be able to protect them. This is dangerous because the situation is getting worse day by day, and according to the expert, in the future the sewer will not be enough to prevent the tidal flooding. It needs to be improved or even redesigned. Not all the shop owners said they want to stay where they are, one or two mentioned that if they had the money they would like to move to somewhere else. But because they need all their money to heighten their homes to protect themselves from the flood they just simply cannot afford it.

The government already is cooperating with LPUBTN KAS, Unika Suprinamoto and a few other (nonprofit) organizations to try and raise understanding/knowledge, donations and support to build public infrastructure. To improve the sanitation health, they are building public toilets located nearby the beach. This should help with the improvement of the conditions of Tambak Lorok because now they do not have an individual toilet and just throw their waste into the streets. The government of the city is also preparing a program to transform a part of the coast of Tambak Lorok into a beach to stimulate the tourism in the area. No everybody will be happy with this though. Inhabitants of Tambak Lorok may feel neglected and not being paid attention to. Thus the government and the inhabitants of the area should meet a good understanding, according to the expert.

The tidal flooding will only get worse, so it is of great importance to further protect the inhabitants of Tambak Lorok by building a dike or dam to reduce the flooding, the expert says. Although it will, according to the expert, not be enough to completely stop the flooding it is the best thing that can be done for now. To keep the inhabitants safe in the future it is best to give them knowledge on how to survive and adapt to the situation because they refuse to move. Furthermore, for the small businesses to be able to keep their businesses in the future it is of importance to raise awareness of the hazard of climate change so they can eventually become self-resilience people, as the expert states.

5. Conclusions and recommendation

5.1 Conclusions

The aim of this research was to gain further understanding of the influence flooding has on both the actual vulnerability and livelihood in relation to the responses of small enterprises in Semarang, Tambak Lorok. Based on the results in chapter 4, it is able, through analysis, to provide conclusions on the influence of floods on small businesses in Tambak Lorok. While many different insights were acquired, the presented conclusions will keep the sub-questions in mind. Below the main question is outlined again.

How does tidal flooding affect the livelihood and vulnerability of small enterprises?

The information obtained through the sub-questions will be used to answer the main question. After the conclusions some recommendations and a short reflection on the research will follow.

5.1.1. Responses

As argued in the theoretical framework (chapter 2.1) the response of small business owners in Tambak Lorok to flooding can be divided into three categories: adaption, mitigation, and non-response.

All inhabitants who are shop owners in Tambak Lorok are used to adapting their homes and shops to the flood by heightening them. This thus could be seen as the adaptation response. Although all the shop owners are aware of the impact flooding has on their life, namely the reduced freedom of movement and the dirty water coming into their homes and shops during the flood, most of the shop owners, however, use the non-response as a way of coping with the flood. The inhabitants are used to the flooding and do not care about the flood coming into their homes and shops anymore. Flooding has no priority and they thus try to ignore it. For the shop owners it is of much greater importance to earn enough money to be able to meet their daily needs. The only thing they do to keep themselves safe is heightening their homes, because they do not have enough money, knowledge or power to make a real change.

At the moment the heightening of their homes and shop as adaptation measure is enough, but the problems will only grow in the future. Because of the climate change the flooding will get worse, while the level of knowledge, money and power are staying the same. This will lead to more non-response, while they are not able to tackle the problems and thus choose to ignore them. This will cause more and more problems they cannot solve.

5.1.2. Livelihoods

To create a secure livelihood three components should simultaneously be addressed: jobs, skills and a safety net. Although due the opening of shops by women of fishermen more jobs are created, there is no existing safety net because the money earned cannot be saved for other uses than heightening their houses or shops. According to the interviews, people's livelihoods strongly depend on their known and fixed clientele. This could also indicate that there is not much competition around, because people keep coming back, despite the flooding. There are no new skills needed to open this kind of shop, making it on the one hand easy to do, but on the other hand hard to distinguish yourself from the rest. When eventually more shops are opened to create a more stable livelihood, the competition increases. The question is, if shop owners will still be able to finance their adaptations. In the interviews performed, the respondents showed that their focus is on the short term, in other words, what do they have to do today to get to tomorrow? Because of the focus on the short term, respondents will never think of an issue as indicated in the beginning of this paragraph (the creation of a safety net). They will not think about the further future and therefore they will not be protected by means of a safety net, because they will not be able to save money while looking only at the short term. From the above we can conclude that this thinking in the short run will eventually lead to an unsustainable and insecure livelihood, which makes the inhabitants of Tambak Lorok very vulnerable.

5.1.3. Vulnerability

The inhabitants of Tambak Lorok live nearby sea, without proper structural measures to protect them from the flooding and with the treat of the rising water due to climate change. All these things make the people vulnerable. The changing environment is not really understood as a factor when looking at the worsening of flooding, but following from the interviews we can conclude that the shop owners are aware of the fact that flooding is getting worse over time. They know they are exposed to the danger of the floods and that it is a risk to keep living there, but they just do not have the resources to either properly protect themselves from the water or to move. As mentioned above, the flood has an enormous influence on livelihoods, but it influences vulnerability as well. The shop owners have completely adjusted their lives to it. This creates a vicious circle in which they are trapped. The livelihood influences the way the shop owners can respond to the flooding, while this on its turn, influences the vulnerability of the community.

The shop owners do not have the knowledge, power or money to make themselves less vulnerable. This lack of knowledge, power and money causes the small businesses to be stuck in thinking in the short term, while they actually should be thinking of long term solutions. They try to solve the problems of today without thinking about tomorrow.

5.2 Recommendations

With the knowledge, power and money of the government, they could try to enter the dialogue with the inhabitants to eventually breach this vicious circle. The poorly available existing knowledge of the inhabitants should be taken into account by the government. As said before, the shop owners lack information about how to make them less vulnerable to flooding, but the inhabitants have knowledge about the area of Tambak Lorok. The exchange of information of the inhabitants and the specialized information of the government, about protection against flooding, may potentially lead to better solutions.

Another way of responding by the government can be focused on creating a safety net. This safety net should provide resources to help shop owners to create a better sustainable livelihood. From the interviews we can conclude there is also a group of shop owners that wishes to move, but are not able to do so because they are too focused on sustaining the current situation.

After the interview with the expert it became more clear that the government tries to help the inhabitants of Tambak Lorok by creating awareness of climate change and the floods. During the interviews with the respondents however it seemed to me they did not have a lot of awareness yet. It would have been very interesting to see how the government tries to create more awareness and how this influences the local community of Tambak Lorok.

5.3 Reflection

The first thing I would like to not only tell my future self, but everyone who is starting to do research is to make back-ups. Make them immediately after you have done the interview, or when you made some pictures. When my phone was stolen in Indonesia, with all my research data still on it, it made me learn this lesson in a way I'd rather not have. Having to reconstruct all the interviews and doing the interview with the expert over again costed me a whole lot of time and energy. Because I had to reconstruct all the interviews I also lost important data, making my research less reliable. So, the next time I will make sure to immediately back-up my recording of the interviews.

The next time I will prepare my observation differently too. I went to Tambak Lorok without a clear idea what I would find, which made the observation a little unstructured. With a more structured observation scheme the observation not only will cost me less time but will be more precise too.

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Appendix 1: Pilot study

Introduction

I am doing research about flooding in Tambak Lorok and I would like to ask you some questions about the floods and their influence on your business.

Is it okay if I record our conversation?

General questions

- How long have you been living in this area?
- How long have you already been running your business here? And why did you decide to start a business in this area?
- What is your role in this business?

Gathering information

- Does your business flood?
- Is there a difference in the intensity of flooding between the rain season and non-rain season?
- If there is a difference, how do you think that is possible?
- Did tidal flooding change over the past 5 years? (in the rain season and non-rain season)
- What are the negative sides of the flooding?
- What are the positive sides of flooding?
- Do you experience discomfort during flooding? In what ways? Or why not?
- How do you cope with the flooding?
- Would you run your business differently if tidal flooding did not affect your business? If so, what would you do differently and why. If not, why not?
- If you had the opportunity to move, would you move? Why? Or why not?

Appendix 2: Interview guide inhabitants

Introduction

I am doing research about flooding in Tambak Lorok and I would like to ask you some questions about the floods and their influence on your business.

Is it okay if I record our conversation?

General questions

- How long have you been living in this area?
- How long have you already been running your business here? And why did you decide to start a business in this area?
- What is your role in this business?
- Do you get help or do you run this business alone?
- What are the working hours?

About their business in relation to flooding

- Does your business flood due to tidal flooding?
- What do you do when your business floods?
- Do you experience discomfort during flooding? In what ways? Or why not?
- What measures do you take to prevent your business from flooding?
- Would you run your business differently if tidal flooding did not affect your business? If so, what would you do differently and why. If not, why not?
- If you had the opportunity to move, would you move? Why? Or why not?
- Where do you see your business in five years?

About the tidal flooding in general

- Did tidal flooding change over the past 5 years?
- Do you think tidal flooding will change in the future? Why do you think so? Or why don't you think so?
- What are the positive sides of flooding?
- What are the negative sides of flooding?
- Who is responsible for the prevention of flooding?

About climate change and flooding

- Can you tell me something about climate change?
- *Explain what climate change is* Do you think climate change influences tidal flooding?
- Do you think a sewer will help prevent tidal flooding?
- How do you feel about the government building a sewer?
- Do you think there are other measures needed to prevent tidal flooding?

Appendix 3: Interview expert

Introduction

Thank you so much for your time! Is it okay if I record our conversation?

Could you please tell me your exact expertise?

I will start with the interview now.

Questions

- Did tidal flooding change over the last 5 years?
- Do you think tidal flooding will change in the future? Why do you think so? Or why do you think it will not?
- What are the positive sides of flooding?
- What are the negative sides of flooding?
- Does tidal flooding have an effect on businesses? Can it be prevented? Will it be different in the future?
- Do you think climate change influences tidal flooding?
- Do you think the construction of the sewer will help prevent tidal flooding?
- Do you think the sewer will be enough to prevent tidal flooding in the future?
- Are there other measures needed to prevent tidal flooding?
- How can local businesses best protect themselves from tidal flooding?
- What should be the role of the government?