

Flooding and managing social vulnerability in Semarang

Access to information and social vulnerability in flood prone neighbourhood Kemijen



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Foreword

I am pleased to present my bachelor thesis about the management of vulnerable positions by local inhabitants of Kemijen. Since this thesis is the result of a fieldwork which is enabled by several people from Nijmegen and Semarang, I am delighted to thank these people for their contributions in the first place.

First I want to thank my supervisors Lothar Smith and Martin van der Velde for their critical and supportive attitude. I also want to thank them for offering me the opportunity to go to Semarang to do my fieldwork. Secondly I am very grateful to Donny Danardono for his great support before and during the fieldwork in Semarang. I felt very welcome and my fellow students and I were able to make a quick start because of his help. Thirdly I also like to thank Jeany. Besides being a good translator she gave useful advises in order to obtain useful data. Fourthly I want to thank the members of the polder board and in particular Mrs Iswari for providing useful data and local representatives Mr Puji and Mr Sumano for guiding us through Kemijen and helping us to find respondents. Even though the interviewed inhabitants of Kemijen might not read this thesis I am really grateful for their open attitude. I hope their situations will improve one day. Finally I want to thank my fellow students who also went to Semarang for their fieldwork. Especially I want to thank Anna Smits and Huub van der Zwaluw for their great cooperation in conducting interviews in Kemijen.

When I started to study human geography I thought I would never like to be a researcher. Even though my perception changed during my study, due to this thesis in which theory is combined with practice I really started to like doing research. Going to Semarang to do fieldwork and seeing theoretical concepts' getting alive has been a great experience. Again, I am pleased to present my thesis and very grateful for all cooperation.

Nijmegen, July 2013

Stefan Ramaker

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Pictures

Unless stated otherwise, pictures in this thesis are made by Huub van der Zwaluw and Stefan Ramaker.

Huub van der Zwaluw figure 13, 17 & 19.

Stefan Ramaker front-page, figure 14, 15, 16 & 18.

Glossary

Word	Meaning
Dasa wisma	Organisation set up and carried out by women
Gotong royong	Mutual and reciprocal assistance
Kemijen	Study area located in flood prone area
PKK	Local organisation organising meetings for people from certain neighbourhoods. Comparable with (forum) RT
Ronda	Night watch
Posyandu	Practice to secure local well-being. Includes providing medicines, take care of elderly and monitor children's growth.
Rob	High tide
(forum) RT	Rukun Tettanga, smallest administrative Javanese division. An RT usually consists of around 40 households and is chaired by an elected man living within this community. Information and funds coming from the local or central government is usually distributed by using the meetings of (forum) RT's
RW	Rukun Warga, neighbourhood association. Communities derived from the larger villages. RW's usually consist of several RT's

*Loose concepts in *italics* refer to this glossary

Summary

Semarang, Indonesia is one of the sinking cities in the tropics. Mainly because of the extensive and still growing withdrawal of groundwater the ground is getting lower and lower each year. Especially low lying, coastal areas in Semarang are suffering from land subsidence. These areas are increasingly plagued by several kinds of floods. Consequently inhabitants living in the coastal area of Semarang can be seen as being vulnerable. One of these coastal neighbourhoods is Kemijen. Kemijen is one of the less prosperous neighbourhoods within the coastal area. An important way individuals and local communities use to intervene in their degree of vulnerability is using their access to resources. Besides material resources, knowledge and information are important resources for local inhabitants to manage their vulnerable positions. Access to information and education are increasingly seen as driving forces in the development of vulnerable communities.

Instead of focusing on the technical aspects of land subsidence this research focuses on the inhabitants living in the suffering areas. By placing the local inhabitants at the centre stage of the research the social differentiation of social vulnerability and access to information is taken seriously. The following research question is derived in order to do so:

How do local inhabitants in Kemijen use their knowledge and access to information to manage their vulnerable positions?

In order to answer the main research question theoretical underpinnings about social vulnerability and accessibility are made. Social vulnerability in this research is defined in terms of the ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being. Important for further operationalisation of is to note that vulnerability is socially differentiated. A certain shock in a neighbourhood influences certain households and communities in a different way. Differential abilities of individuals to respond to stresses placed on their livelihoods and the institutional context are seen as important stakeholders in the differentiation of social vulnerability.

An important cause of differential abilities of individuals to respond to external stresses is access to resources. In past studies resources were commonly seen as physical resources. Access to resources like information and education increasingly took its part in the vulnerability framework. Effective adaption is contingent on the availability of two important prerequisites: information on what to adapt to and how to adapt, and resources to implement the adaption measures. Physical resources only cannot help individuals or communities to adapt effectively. By appointing to access to information several information channels are meant. Information can be provided through interaction within a community, experience and institutions. The ability of individuals or social groupings to respond to external stress is highly dependent on the accessibility of- and entitlement to resources. The extent to which individuals, groups or communities are 'entitled' to make use of resources determines the ability of that particular population to cope with or adapt to stresses.

In order to research the role knowledge and access to information play for people in Kemijen to manage their vulnerable positions 13 inhabitants of Kemijen with different characteristics were interviewed. Besides asking them about ways they use to manage their positions basic observation were made of the concerning households. Furthermore some experts were interviewed in order to obtain information about social vulnerability in the context of Kemijen and to obtain data about the role of institutions in Kemijen.

Several kinds of knowledge and information are owned by inhabitants of Kemijen. One of the channels through which inhabitants of Kemijen obtain their information is personal experience. These experiences often are based on individual observations. Even though these strategies seem to be very basic, it is an important strategy used by vulnerable households to reduce the impacts of floods. Mostly the strategies applied as a result of personal observations can be typified as coping strategies meant for the short-term. For example, by temporarily storing belongings in a higher place in order to save them, no structural adjustments or sustainable solutions are made.

Another important source of information and knowledge in Kemijen are the inhabitants themselves. Within the interviews several practices of how people obtain information through neighbours, family members and friends are named. By communicating with other people about coping and adaptation strategies, several strategies used in Kemijen seem to be commonly used. Examples of these strategies are heightening the houses, store equipment at higher places during the floods and investing in education. Relations within communities are also used to warn each other in cases of emergency. Through local interactions people are informed about an upcoming flood.

An external source of information is information derived from the media. The use of this kind of media as an information resource seems to be very limited. Even though several inhabitants have access to the internet and other media, these sources doesn't seem to be used to obtain knowledge and information. Probably a lack of education on how to use access to this kind of resources restricts people to use this knowledge.

Finally institutions play an important role in the knowledge and access to information. Probably the most important institution for people living in Kemijen is *Gotong royong*, also known as mutual and reciprocal assistance. The most vulnerable seem to appreciate this practice the most. Since the vulnerable need other people in cases of for example floods or diseases they are willing to invest in relations within their communities. *Gotong royong* in this sense can be seen as a strategy used by the vulnerable to improve their resilience to shocks. Other institutions are the *(forum-)RT* and the *PKK*. These institutions organise meetings in which the local inhabitants of Kemijen are informed. These gatherings seem to be useful to help people to reduce their vulnerable positions. Nevertheless social vulnerability is also reinforced by local gatherings. Since women do not participate in this meetings female-headed household won't be achieved through these meetings. Also perceived entitlement and focus on short-term measures may lead to absence of certain households in local gatherings. Another institution in Kemijen is *Ronda*. Officially *Ronda* is meant to prevent a neighbourhood from crime, but in some neighbourhoods *Ronda* is used to warn people when the community is getting flooded at night. By providing this information people are helped to carry out their coping strategies and collective vulnerability is reduced. Finally female organisations teach people about for example hygiene. Collective vulnerability can be reduced by these practices as well.

In conclusion, the way people use their knowledge and access to information is socially differentiated. Nevertheless similarities amongst the respondents can be found in the way access to knowledge and information is used. Information and knowledge is used to improve social vulnerability. Having said that access to information for an individual does not necessarily lead to a better management of the vulnerability; meaningful knowledge often provided through education is essential to be able to use this knowledge.

1. Introduction

In the past decades much has changed for a significant proportion of people living in Semarang, Indonesia. Inhabitants living in the coastal areas of the city are increasingly confronted with floods due to land subsidence which makes Semarang one of the 'sinking cities' in the tropics. Daily life of people living within these coastal areas is strongly influenced by tidal flooding (Marfai & King, 2007). The vulnerability of coastal inhabitants has grown extensively over the past years. Where people in vulnerable areas were first seen as helpless victims, the vulnerability debate now focuses on 'what the poor have, rather than what they do not have' (Moser, 1998; Adger, 1999). By using this approach, the people living in vulnerable areas become agents of their own livelihoods. 'There is a growing recognition that the poor are strategic managers of complex asset portfolios' (Moser, 1998, p. 5). Due to this shift, the strategies poor people use to adapt to external stresses become visible. However each individual has its own agency, the availability of recourses is important in determining ones vulnerability. Besides material resources, immaterial resources like knowledge and access to information have an important role in how people manage their vulnerable positions in relation to the floods.

1.1. Background

Tidal flooding is a main concern in many cities in tropical areas over the past decades. A growing number of people are facing structural damages and are highly influenced in their daily activities (Harwitasari, 2009, p. 3). Semarang is one of this cities in which the impact of tidal flooding has grown. Tidal flooding has become a structural concern in the livelihoods of many people living in the coastal zones of Semarang. In the literature regarding tidal flooding there is a great amount of agreement about the main causes of the floods in Semarang (Marfai & King, 2007; Dewi, 2007; Harwitasari & Van Ast, 2011). First of all the growing impact of tidal flooding is related to land subsidence in Semarang. At a considerable smaller scale sea level rise plays a role in the causes of tidal flooding.

Land subsidence in tropical cities like Semarang is explained by three major causes: extensive withdrawal of groundwater, natural consolidation of alluvium soil and the load of constructions exerting pressure on the soil (Marfai & King, 2007). By far, the most influential cause of land subsidence is the extensive withdrawal of groundwater (Marfai & King, 2007, p. 651-652):

'Groundwater withdrawal results in fluid-pressure change in the layers, especially in sedimentary and clay materials. Excessive pumping of such aquifer systems, which contain rich clay materials, may cause permanent compaction that cannot be recovered after stress and leads to land subsidence.'

Due to the growing population combined with the increasing economic activities in the city of Semarang the abstraction of groundwater is increasing sharply. The registered groundwater abstraction increased from 16.9 million m³ per year in 1990 to 38 million m³ per year in 2000 and is still growing (Hasanuddin, 2010).

People living in areas which are exposed to environmental hazards or any other kinds of external stresses are often defined as vulnerable. Within the literature the term vulnerable implies both, the degree of exposure to external stresses and the sensitivity or adaptive capability of an individual or social group (Adger, 1999; Füssel & Klein, 2006; Schipper & Burton, 2008; Moser, 1998). Blaikie et al. (1994) uses these two factors to give a definition of social vulnerability:

'We define vulnerability in terms of ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being.'

Blaikie et al. (1994) makes a clear distinction between the biophysical and the social dimension of vulnerability. Vulnerability in terms of the social dimension can be defined as 'the capacity to anticipate, cope with, resist and recover from the impact of a natural hazard'. By looking at the social vulnerability of inhabitants of the coastal zones in Semarang we are mainly interested in this degree of ability or inability to respond to the external stress of tidal flooding.

The ability of individuals or social groupings to respond to external stress is highly dependent on the accessibility of- and entitlement to resources. 'The extent to which individuals, groups or communities are 'entitled' to make use of resources determines the ability of that particular population to cope with or adapt to stress' (Kelly & Adger, 2000). One of the resources having an impact on this extent is information, education and training about the underlying causes and the ways to respond to these causes.

According to Marfai et al. (2008) most of the people living in the coastal areas of Semarang are aware that the area they live is subject to tidal flooding. 67% of these people are aware of the main cause of inundation, namely land subsidence. Although there are several researches like the impact research of Marfai et al. (2008) elaborating on the knowledge of people living in the coastal areas of Semarang, a clear link between the access information, knowledge and management of social vulnerability has not been investigated yet. A great amount of researches carried out in Semarang have a technical approach towards tidal flooding and land subsidence. About social impacts and the way people manage their vulnerable position towards the floods less knowledge had been obtained.

Knowledge about the link between access to information and management of social vulnerability could provide some useful insight in the acting of individuals and social groupings facing floods in Semarang. A better understanding of the strategies used by local inhabitants towards floods may contribute to institutions to provide more structural measures regarding floods. Besides the insight of individuals and social groupings this research could provide some useful insight in the role of accessibility and education in the entitlement and social vulnerability of individuals and social groupings.

1.2. Study area

As mentioned in the background, Semarang is one of the sinking cities in the tropical area. With its population of approximately 1.5 million Semarang is the fifth city of Indonesia. The city is located in the north of the Central Java province (figure 1). Semarang can roughly be divided into two parts, the high- and the low city. The southern part of Semarang is located on the hills. This part is not suffering from flooding and land subsidence. The northern part on the other hand is close to the Java Sea and relatively flat as well. Because of these physical features neighbourhoods in the north of the city are facing floods and land subsidence to varying degrees.

According to Marfai and King (2007) around 15.000 hectares in the city of Semarang can be categorized as flood prone area. Thereafter Marfai and King (2007) distinguish between three types of floods in Semarang. First the local flood inundation occurs mainly in the rainy season. Drainage systems in the north of Semarang are not able to catch the large runoff during the rainy season

(Harwitasari, 2009). Secondly a significant part of the floods in the north of Semarang are caused by inundated rivers. Especially after periods of heavy rain rivers cannot bear the great amount of water. Third, floods are caused by high tide. Dependent on the position of a neighbourhood with respect to the sea level, tidal flooding is an important cause of water problems in the coastal area of Semarang. Like the position with respect to the sea level neighbourhoods in Semarang are faced with different kinds of floods due to their physical features.



Figure 1: Java, source: welt-atlas.com

One of the neighbourhoods suffering from flooding and land subsidence is Kemijen. Kemijen is a part of Semarang Timur (East Semarang). According to the Economic feasibility of Banger pilot polder (n.d.) most of the households in Semarang Timur can be categorized as poor households. Within Semarang Timur Kemijen is one of the poorest areas. Daily live for most of the people living in this neighbourhood is strongly influenced by several types of floods and land subsidence (Economic feasibility of Banger pilot polder, n.d.). Because of the vulnerable position of many people living in Kemijen, this neighbourhood is chosen to research the role access to knowledge plays in the social vulnerability of people living in Kemijen.

Another reason Kemijen is an interesting place to research social vulnerability is the attendance of the water board, also known as polder board. Aim of this board is to make Kemijen part of a polder. Instead of short term solutions like heightening the road layer by layer, within this project sustainable solutions are sought for the problem of land subsidence. This pilot project is a co-operation between local NGO's, the Municipality of Semarang and two Dutch ministries. Within this pilot local representatives, scientists and representatives of the stakeholders are working together in 'the water board'. By involving, educating, informing and training people from the neighbourhood, experts and stakeholders, the polder has become a typical example of 'polderen'. More information about the role of this institution is provided in chapter 4.

1.3. Research objective

In the previous section, the background and study area of the research are outlined. As described, most of the researches concerning land subsidence in Semarang have a technical approach. Within these researches the causes of tidal flooding and the degree of land subsidence are investigated, rather than the impacts of land subsidence on the local inhabitants of Kemijen. By placing the local inhabitants at the centre stage of the research, a better representation of the effects of land subsidence and tidal flooding can be obtained. Having said that, giving a complete overview of the effects and influences of tidal flooding on people living in the coastal zone of Semarang or even Kemijen is hardly possible. Vulnerability is social differentiated (Farrington, Ramasut & Walker, 2002;

Adger, 1999), which makes it impossible to describe a direct link between ones vulnerability and entitlement and access to resources.

Nevertheless by researching the link between access to knowledge and information resources about tidal flooding and vulnerability, patterns of the link between vulnerability and access to knowledge can be found. These patterns could provide insight which policy makers can use in shaping policies concerning the accessibility of knowledge. A better understanding of the ways local people gain access to resources contribute to institutions to provide more structural measures regarding floods. Since better measures cannot directly be taken after doing this research the first aim is to obtain knowledge about how access to information, knowledge and social vulnerability interact. Subsequently the following research objective is derived.

The research objective is to obtain knowledge about the link between access to information and knowledge and management of social vulnerability, by placing the local inhabitants of Kemijen in the centre stage of the research.

Figure 2: research objective

Even though the link between access to resources and the position of individuals or social groupings have been studied often, the share of access to information and knowledge within the social vulnerability framework is significantly less adjusted than access to primary resources like food and labour. By investigating the link between access to resources and social vulnerability, a theoretical contribution to the share of accessibility of information and knowledge in the accessibility framework can be made.

1.4. Research model

To provide insight in the link between access to information and knowledge and management of social vulnerability, a logical structure is needed. In the following research model (figure 3) the different steps in the research are mentioned. However the different parts in the model refer to a particular sequence it is important to note that doing research in social sciences is an iterative process (Verschuren & Doorewaard, 2007). Even though the different ‘stages’ are noted sequentially, the model should not be seen as a fixed research planning.

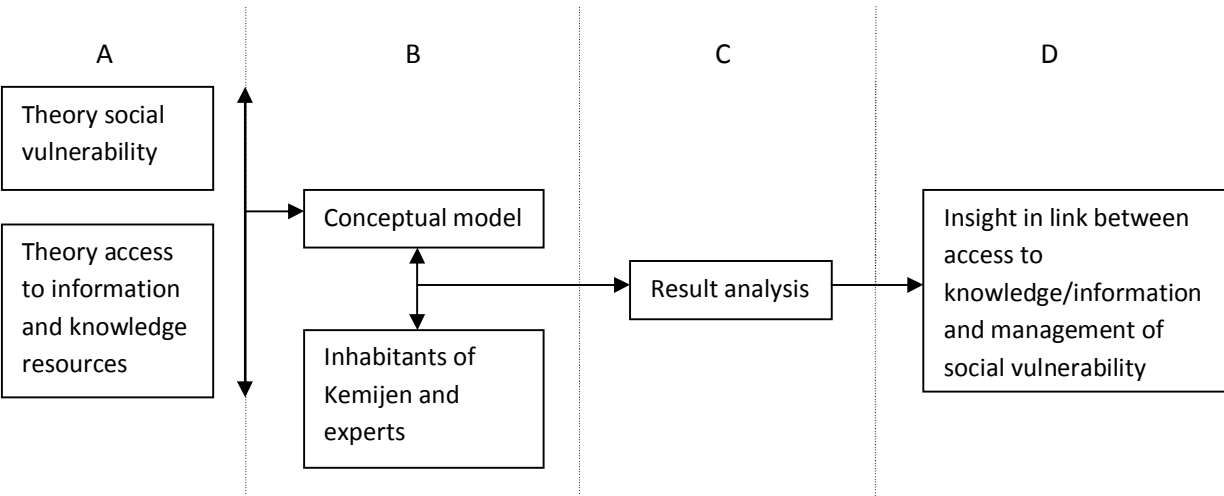


Figure 3: research model

First of all a theoretical base (A) is needed to obtain insight in theoretical literature concerning social vulnerability. Since accessibility is one of the indicators of social vulnerability, the theoretical link between these vulnerability and access to resources will be examined. By combining the concerning theories, a conceptual framework (B) will be made. In this framework the theoretical link between social vulnerability and access to knowledge resources will be given. This framework will be used as framework for analysis by conducting data in Kemijen. In the third 'stage' (C) the result of the fieldwork in Kemijen will be interpreted and confronted with the conceptual framework. By combining these theoretical insights on the effect of accessibility of knowledge resources on social vulnerability both, applied and theoretical insight (D) will be obtained.

1.5. Research questions

Within this section the research question derived from the objective and model will be given. Since this research aims to place the local inhabitants of coastal zones at the centre stage of the research, these people should be the centred in the research question. From this perspective the influence of accessibility of information and knowledge on social vulnerability is questioned. By combining this objective with the people centred approach the following research question is deduced:

How do local inhabitants in Kemijen use their knowledge and access to information to manage their vulnerable positions?

Figure 4: research question

Since this research aims to contribute to the knowledge about behaviour of people the question has an explanatory nature. The objective is to gain knowledge about ways the coastal inhabitants use to manage their positions, rather than attempting to solve the problems faced by people living close to the sea in Semarang. Nevertheless institutions could use the gained knowledge to think about ways to reduce social vulnerability.

In order to answer the research question, several sub-questions are derived from the research question. By passing these different sub-questions both, the link between access to information resources and social vulnerability, and the degree in which inhabitants of the coastal zones use this information, can be investigated. The following research questions are derived in order to answer the main research question:

Sub-question 1: What do inhabitants of Kemijen know about causes of- and strategies towards floods?

Sub-question 2: How do inhabitants of Kemijen obtain knowledge and information about floods and concerning strategies?

Sub-question3: How do institutions influence the access to information for local inhabitants of Kemijen?

Figure 5: sub-questions derived from the research question

By answering the questions stated above, knowledge is obtained to answer the research question. In order to do the research, the theoretical link between accessibility of knowledge resources and social vulnerability should be examined in the theoretical framework and also be tested in practice. By

combining this framework with data about the knowledge of inhabitants of the coastal zones in Semarang and the way they use their access to knowledge, the link between accessibility of information and knowledge and social vulnerability of inhabitants of Kemijen can be made.

1.6. Reading guide

In order to be able to answer the research questions stated in the previous section, several steps are taken. The first section of chapter 2 elaborates on relevant theories about social vulnerability, access to information, the role of knowledge, entitlement, education and the local context. Within the second section of this chapter these different theoretical concepts will be further operationalised in order to be able to have a scope to analyse the data obtained in Kemijen. Secondly within the third chapter methodological choices will be elaborated. The chosen strategies to collect and interpret data will be outlined and explained. After this elaboration the data will be presented in chapters 4 and 5 in order to be able to analyse this data afterwards. In chapter 4 the role of several institutions will be described. Thereafter chapter 5 provides four portraits of different households in order. Within chapter 6 the former chapters (4 and 5) will be used to analyse several practices of vulnerability reduction or vulnerability reinforcement will be analysed. Finally, in chapter 7 conclusions will be drawn by answering the sub-questions and eventually the main question. Thereafter a critical view on this research will be provided in the second section of this chapter. Some recommendations for future studies will be given in this section too.

2. Value of access in the vulnerability framework: Theory

'Knowledge is power. Information is liberating. Education is the premise of progress, in every society, in every family'. -Kofi Annan-

As stated by Kofi Annan, knowledge, information and education are of great importance in society. Subsequently access to information and knowledge might play an important role in strategies used to reduce the vulnerability of an individual or a community. By elaborating the relevant theoretical contributions on this theme, the link with practice can be made. By giving the conceptual model (in the second section) derived from the theoretical framework and operationalising the concepts within the conceptual model concrete research objects can be derived. The operationalisation given at the end of this chapter will provide a base for the methodological choices that will be made in chapter 3.

2.1. Theoretical framework

As mentioned in the section before, knowledge concerning vulnerability and access to knowledge is important to examine the link between access to resources and the way people manage their vulnerable positions. In this section the relevant aspects concerning the different elements concerning the 'link' will be elaborated. After doing this the theoretical link will be made by giving the conceptual framework in order to provide a research perspective.

2.1.1. Vulnerability framework

In past studies the vulnerability was often seen from the wounded soldier approach. '*Vulnerabilis* was the term used by the Romans to describe the state of a soldier lying wounded on the battlefield' (Kelly & Adger, 2000). In this sense vulnerability is defined by the existing wound and not by the future stress (Kelly & Adger, 2000; Moser, 1998). Within this definition, the vulnerability of individuals and social groupings is rather determined by the current situation of these 'vulnerable' groupings rather than on possible future stress. As also mentioned in the background section in chapter 1, vulnerability in modern literature often refers to the ability or disability of individuals and social groupings to respond to external stress. By emphasising the ability, rather than the existing wound, the modern definition of vulnerability is much more future-oriented. Nevertheless, vulnerability cannot only be defined by the abilities individuals and social grouping have. The external stress placed on these groupings is of great essence in giving a definition of vulnerability. Blaikie et al. (1994) clearly appoints these two parts of vulnerability by giving the following definition of vulnerability:

'We define vulnerability in terms of ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being.'

Besides appointing the two parts of vulnerability, Blaikie et al. (1994) makes a clear distinction between the social and biophysical factors of vulnerability. 'Vulnerability can therefore be explained by a combination of social factors and environmental risk, where risk are those physical aspects of climate related hazards exogenous to the social system' (Adger, 1999). Since we are mainly interested in the ability or inability of individuals to respond to environmental hazards, we use the term social vulnerability to emphasise the attention directed to the abilities of people.

Although external stress is an essential part in the vulnerability framework, the distinction between external stress and abilities of individuals and social grouping enables us to focus on the social

dimension of vulnerability. Since the external stress often cannot directly be influenced by the individuals or social grouping facing the environmental hazards, the external stress is not a part of the social system which will be researched. The definition of vulnerability given above implies two dimensions of vulnerability: sensitivity and resilience (Hadipuro, 2012; Moser, 1998). Sensitivity within this dimension is the intensity in which the hazards are experienced. Sensitivity in this sense can mainly be linked to the external stress in the given definition. Resilience refers to the capacity to bounce back after a crisis (Hadipuro, 2012). The resilience of individuals or social groupings refers to their ability to respond to the intensity in which the hazards are experienced. Dietz et al. (2004 in Hadipuro, 2012) makes a distinction between four degrees of vulnerability. By confronting time with the livelihood security, four degrees of vulnerability can be identified (figure 6). The figure below clearly shows the importance of the resilience individuals or social groupings have. The greater the resilience of an individual or social group, the faster the livelihood security will be recovered after a shock.

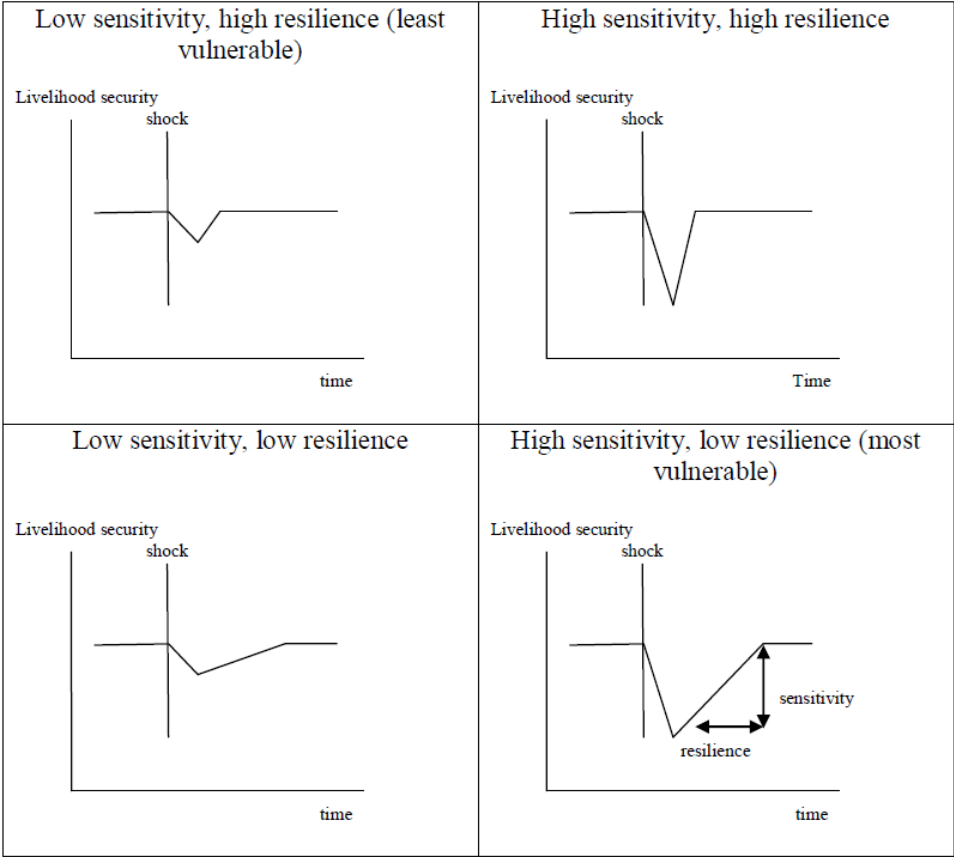


Figure 6: four degrees of vulnerability (Dietz, Ruben & Vergahen, 2004)

By making a vulnerability framework, it is important to note that people facing environmental hazards have different abilities to cope with external stress (Füssel & Klein, 2006). Vulnerability is that sense should not be seen as a fixed degree for people living in a certain region. Vulnerability of individuals and social groupings is determined by many factors which are different for stakeholders involved. Vulnerability, thus is socially differentiated (Adger, 1996) and constructed by individuals and social groupings (Ribot, Hajam & Watson, 2009). The differential in resilience corresponds closely to the non-climatic, social factors influencing the vulnerability of a social group or an individual

(Füssel & Klein, 2006). Mainly non-physical factors influence the differential in vulnerability of people facing environmental stress:

Vulnerability is a state of well-being and is not the same for different populations living under different environmental conditions or faced with complex interactions of social norms, political institutions and resource endowments, technologies and inequalities. The causes of vulnerability are related to environmental and institutional context. Indeed changes in the social causes of vulnerability happen at much more rapid scales than many environmental changes. (Watts & Bohle, 1993)

The differential in abilities of people to respond to environmental stress refers to the autonomy these people have. The 'poor' are no longer seen as helpless victims without any ability to respond to external stress. According to Moser (1998), there is a growing recognition that the poor are strategic managers of complex asset portfolios. These assets have a broad scope and include assets concerning labour, housing, social and economic infrastructure, household relations and social capital (Ribot, Hajam & Watson, 2009; Adger, 1999; Moser, 1998). The loads of assets managed by 'the vulnerable' are unevenly distributed, which causes a difference in degree of vulnerability: 'the more assets people have, the less vulnerable they are, and the greater the erosion of people's assets, the greater their insecurity' (Moser, 1998, p. 3).

To measure the vulnerability of individuals and social groupings a vulnerability framework is needed. As mentioned before the assets people own play an important role in determining one's vulnerability. The asset management of urban people should be seen from a wide perspective. Since poverty is not the same as vulnerability (Moser, 1998; Adger, 1999), also intangible assets such as social relations and education should be addressed within the framework. The World Bank (1990) provided a vulnerability framework in which both, tangible and intangible assets are compromised. According to Moser (1998) the assets managed by a poor urban household can be summarised as follows:

- Labour: commonly defined as the most important asset of poor people.
- Human capital: health status, which determines people's capacity to work, and skills and education, which determine the return to their labour.
- Productive assets: for poor urban households the most important often is housing.
- Household relations: a mechanism for pooling income and sharing consumption.
- Social capital: reciprocity within communities and between household based on trust deriving from social ties.

Different strategies are used by the vulnerable within these different assets. In the next sub-section these strategies will be elaborated.

2.1.2. Mitigating, adapting and coping

The strategies used by 'the vulnerable' to manage their positions can be typified in different categories (Farrington, Ramasut & Walker, 2002). In general the more assets people own, the less vulnerable they are and the more likely their vulnerable position is managed in a sustainable way. The greater the erosion of people's assets, the greater their insecurity (Moser, 1998). The assets owned by an individual or social grouping are having influence on the management of their vulnerable position.

Within literature about people being confronted with climate change three different responses are distinguished: mitigation-, adaptation- and coping strategies. Briefly these different strategies refer to the durability of the 'solutions' provided by the different strategies used. Originally these strategies are meant for strategies used towards climate change. Even though the major causes of flooding and land subsidence cannot be attributed to climate change, effects of the extensive withdrawal of groundwater in Semarang can be compared to certain effects of climate change. People living in Kemijen can decide to mitigate, adapt to or to cope with the stresses placed on their livelihoods. Below the different strategies will be elaborated.

The first, most short-term respond to external stresses are coping strategies. These strategies can be seen as primarily strategies used in order to secure a certain livelihood for a short period. According to Davies (1993) coping strategies are the bundle of poor people's responses to declining food availability and entitlements in abnormal seasons or years. Besides responses to food availability similar strategies are also used in other urgent situations (Farrington, Ramasut & Walker, 2002). In the context of floods coping strategies can be typified as for example temporarily moving to another place and saving important equipments at higher places when the flood comes. Even though these strategies may be very useful in the short term, they may be bad for the longer term development (Davies, 1993)

Both from the point of view of those who practice them and of those who seek to intervene to facilitate the development process. Implicit in coping strategies is that the entire working life of subsistence producers is taken up in acquiring food; (... or other kinds of resources) enabling people to stand still, but preventing them from moving ahead.

A second strategy used by people who are faced with external stresses is adaptation. In comparison to coping strategies adaptation strategies are used to implement more structural measures. According to Reser and Swim (2010) the common definition for adaptation is adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Consequently Reser and Swim (2010) give a few examples of adaption strategies.

Adaptation in this climate change science context often refers to structural changes, such as building more 'resistant' human settlements and infrastructure or providing ways to ensure adequate and sustainable water and food availability and micro and macro human system adjustments, such as those relating to households, communities, institutions, and regional, national, and global governance structures and policies.

McLeman and Smit (2006) argue that one of these more structural adaption strategies is to migrate. Migration according to them is not just an automatic response to one singular risk, but influenced by numerous factors. Since migration can free someone from external stresses, migration can be seen as an adaption strategy towards these stresses.

Thirdly mitigation can be seen as a major category in dealing with external stress. Briefly mitigation strategies aim to tackle the environmental problems at their roots. The biggest difference between adaptation and mitigation strategies is the time of intervention. In order to clarify this difference Shazli and Lecocq (2009) provided the following comparison of adaptation and mitigation.

Mitigation consists of reducing emissions at the beginning of the chain to minimize climate change in the first place. By contrast, adaptation consists of responding to climate change impacts at the end of the chain.

Even though this definition is given in the climate change context the underlying argumentation of reducing emissions at the beginning of the chain may be also appropriate for the context in Kemijen. Since the extensive withdrawal of groundwater is seen as the major cause of land subsidence, mitigation strategies in Semarang can be found in reducing the amount of groundwater extracted. Thus, even though the water problems cannot be seen as results of climate change, the framework of coping, adaptation and mitigation strategies is used in similar situations. Consequently this framework might provide some useful insight in the strategies used by the local inhabitants of Kemijen.

2.1.3. Access to knowledge resources

As shown in the first sub-section the dependency on resources is seen as one of the causes of individual vulnerability. Although it is hard to define the exact role of access to resources in the vulnerability framework, access to resources is seen as an important prerequisite in defining the degree of vulnerability of individuals and social groupings (Adger, 1999; Füssel & Klein, 2006; Ribot, Hajam & Watson, 2009). Resources can roughly be grouped in physical and non-physical resources. However physical resources are of great importance in the construction of livelihoods, non physical resources like information is of great importance for 'effective adaption':

Effective adaption to climate change is contingent on the availability of two important prerequisites: information on what to adapt to and how to adapt, and resources to implement the adaption measures. (Füssel & Klein, 2006, p. 304)

According to Kelly and Adger (2000), vulnerability or security of any group is determined by resource availability and by the entitlement of individuals and groups to call on these resources. 'Resources and wealth in themselves do not constitute security since resources are mediated through property rights and access to them' (Adger, 1999 p. 252-253). In this sense the accessibility, rather than information concerning environmental stress, is an important factor influencing the vulnerability of individuals and social groupings. Poverty is an important indicator related to marginalisation and the lack of access to resources which are critical when faced with the risk of hazards and the resultant of stress on livelihoods (Adger, 1999). In most literature information about causes and adaption strategies to external stresses is seen as information provided by local directors or experts on environmental hazards. Good facilitation of information in this sense is largely dependent on the supply of information by local governments and experts:

Facilitation refers to activities that enhance adaptive capacity, such as scientific research, data collection, awareness raising, capacity building, and the establishment of institutions, information networks, and legal frameworks for action. Implementation refers to activities that actually avoid adverse climate impacts on a system by reducing its exposure or sensitivity to climatic hazards, or by moderating relevant non-climatic factors. (Füssel & Klein, 2006, p. 322-323)

Besides the adaptive capacity of people facing external stress to gather useful information provided by experts or governmental organisations, indigenous knowledge of people living in hazard areas is of great importance for 'the vulnerable' to construct their livelihoods (Hadmer, 2009). However there

are no absolute values known of the contribution of indigenous knowledge on adaption strategies, the indigenous knowledge seems to have an important part in the management of assets available. In developmental studies the value of indigenous knowledge is re-estimated: 'Incorporating indigenous knowledge can add value to the development of sustainable climate change mitigation and adaption strategies that are rich in local content, and planned in conjunction with local people' (Nyong, Adesina & Elasha, 2007). Besides providing inhabitants of hazard areas information on effective adaption strategies, the knowledge gained by these local inhabitants is often of great importance in managing their vulnerable positions.

It is important to know that not all indigenous practices are beneficial to the sustainable development of a local community; and not all indigenous knowledge can a priori provide the right solution for a given problem (Nyong, Adesina & Elasha, 2007). Effective adaption to external stress requires a certain degree of knowledge on what to adapt to (Füssel & Klein, 2006). Social communities in some cases lack crucial knowledge to adapt effectively to climate change (Smithers & Smit, 1997). Having said that adaption strategies that seem to be inadequate or adverse can be very valuable or reasoned for these local communities.

2.1.4. Entitlement

As mentioned in the previous sub-section entitlement is an important indicator of access to knowledge. According to Adger and Kelly (1999) the social vulnerability of any group or individual is determined by the availability of resources and, crucially, the entitlement to call on these resources. This entitlement is also appointed by Sen (1987) in her research about feminine. According to this research the real issue is not primarily the over-all availability of food, but it is the acquirement by individuals and families. Consequently the link between the over-all availability of other resources and the acquirement of these resources can be made. Access to knowledge and information in this sense is closely linked to the entitlement of social groupings and individuals. Consequently the extent to which individuals, groups or communities are 'entitled' to make use of resources determines the ability of that particular population to cope with or to adapt to stress (Adger & Kelly, 1999). As described above, social vulnerability, access to resources and entitlement to call on these resources are closely linked. These links should not be seen as fixed relations, but rather as reciprocal variable relations. Entitlement is a driving force of social vulnerability and access to resources, but on the other hand entitlement can be seen as a result of social vulnerability and access to resources.

Adaption, in summary, occurs through the actions of individuals facilitated or constrained by relevant institutions as well as through the action of institutions themselves. The extent to which action is constrained and the resources upon which adaptive measures can be based from the basis of the analysis of social vulnerability to climate variability and the architecture of entitlements, ranging from the situation of the individual to the social institutions of wider political economy. (Adger & Kelly, 1999)

As argued by Adger and Kelly (1999) in the quote above, institutions play an important role in the entitlement of individuals and social groupings to call on certain resources. By appointing institutions Adger and Kelly (1999) emphasise the role of the government. Even though the government can have an important role in the entitlement of individuals and social groupings institutions in the context of Kemijen should be interpreted broader than the government only. Local practices play an important role in the accessibility of resources in Kemijen (Hadipuro, personal communication, 8th of April 2013; Iswari, personal communication, 9th of April 2013). The position of an individual or a social group

influences their degree of accessibility to several resources. Examples of local practices in Indonesia and specifically Kemijen will be elaborated in sub-section 6.

Another driving force in the access to resources is inequality within or between different parts of the population. According to Sen (1987) the entitlement of a person stand for the set of different bundles of different alternative commodity that the person can acquire through the use of the various legal channels of acquirement open to someone in this position. Since the assets owned by particular inhabitants of areas facing external stresses are socially differentiated (Moser, 1998) the social vulnerable have unequal positions. Since external stresses might worsen the situation of the most vulnerable the most, inequality in flood prone areas might increase over time. According to Adger and Kelly (1999) increasing inequality over time within a population, or between different parts of the population, increases collective vulnerability to climate change.

Such changes in inequality are linked to the reduction of communal allocation of resources and the pooling of risk, and other social phenomena associated with the 'moral economy' in which entitlements to resources can be realised in times of crisis.

2.1.5. Education and training

Within existing literature on education and training there is a growing agreement on the importance of education and training to enable people to manage their vulnerable positions (Wamsler, Brink & Rentela, 2012). In order to explore the link between access to knowledge and social vulnerability the role of education and training is elaborated in this sub-section. Within different studies on the impact of education, several reasons for the importance of education in areas that are vulnerable towards climate change are appointed. For example, the International council on human rights policy (2008) gave education the same degree of importance as health:

'Education is as important as health: a well-educated population is better equipped to recognise in advance the threats posed by a changing climate and to make preparations. This is one of many areas where ordinary development aid, properly directed, can potentially achieve multiple objectives at once, serving classic development and human rights aims while at the same time contributing to society's long-term ability to adapt to climate change.'

In a case study Wamsler, Brink and Rental (2012) found out that education can have a direct influence on people's risk perception. According to this study, formal education is considered to have a positive effect on people's:

- Awareness and understanding of existing risk
- Access to (and provision of) information on risk reduction
- Acceptance and adequate use of institutional support
- Way of coping (by improving their own risk-reduction strategies)

Even though formal education can have several positive effects on the way people manage their vulnerable positions, Bangay and Blum (2010) argue that the access to education must be meaningful: 'access must be characterized by high attendance rates, progression through grades with little or no repetition, and learning outcomes which confirm basic skills are being mastered' (Lewin 2007 in Bangay & Blum, 2010). Besides this Bangay and Blum (2010) also note that education is likely

to be more meaningful when programmes deliver knowledge and skills which are relevant to local contexts and needs.

As mentioned meaningful education is considered to have a positive effect on access to- and provision of information on risk reduction. In this sense education can contribute in how people from Kemijen manage their vulnerable positions. According to Wamsler et al. (2012) a higher level of education has a direct effect on people's access to information. These people tend to have more access to information about hazards and other threats, safer places to live, measures to reduce risk, knowledge about potential institutional support and knowledge about people's own rights. Besides the knowledge obtained through education and training, people with a higher education have some other advantages over people who have no or little education (Bangay & Blum, 2010). First of all educated people more often have the skills to reach and understand several channels of information like the internet, newspapers and other media. Secondly people with higher levels of education are more likely to be successful in their contacts with authorities and emergency officials (Wamsler et al., 2012). According to Cutter et al. (2003) people with higher levels of education are more likely to be responsive to disaster warnings and alerts. Besides the increased responsiveness education makes residents less suspicious of the authorities. The more education, the more likely people are willing to accept institutional support, if considered adequate (Wamsler et al., 2012). In the third place education is an important factor in the role of a given individual within a local community. In the next sub-section the role of the local culture which in the accessibility of knowledge resources will be discussed.

Within Kemijen education might play an important role. As stated above a higher level of education can have positive effects on the accessibility of an inhabitant of Kemijen. By operationalising these concepts in the second section practices of vulnerability reduction through education in Kemijen might be found.

2.1.6. Local context

As mentioned in the previous sub-sections, access to information is often restricted or enabled by institutions. Institutions within this context should be interpreted broadly. Both, local practices and local structures are important determinants in ones access to knowledge. In order to be able to understand how people in Kemijen obtain their information, some context of the local structures and culture is essential. Javanese structures, local practices and the role of these institutions will be represented in this sub-section.

The current administrative divisions in Indonesia are largely determined by its colonial history with the Netherlands and Japan. Especially the Japanese influence is still strongly engaged in the way people work together in their neighbourhoods (Iswari, personal communication). Administratively Indonesia consists of 30 provinces. These provinces all have their own legislature and governor. Each province is divided into several districts (kecamatan) which are subdivided into administrative villages (kelurahan). These villages are the lowest level in which the government is directly involved. Within this administrative network Kemijen can be seen as one of the 117 administrative villages (kelurahan's) of Semarang. These villages are further divided into several communities (Rukun Warga, RW). The smallest administrative divisions in Javanese cities are the neighbourhood communities, also known as Rukun Tetangga's or RT's (Fitriani, Hofman & Kaiser, 2005). An RT usually

consists of around 40 households and is chaired by an elected man living within this community. Information and funds coming from the local or central government is usually distributed by using the meetings of (forum) *RT*'s.

Besides the administrative divisions there are also a number of practices used which are important to understand how people work together in neighbourhoods like Kemijen. The first important overarching practice is *Gotong royong*, which stands for mutual and reciprocal assistance. This practice represents the communal interest which is very important in the Indonesian culture and especially in neighbourhoods like Kemijen (Hadipuro, personal communication). Over the years *Gotong royong* has become a key element in the Indonesian system of political and cultural power (Harwatisari, 2009). Besides the communal interest represented within this practice, the reciprocal character makes people willing to help others. In that sense *Gotong royong* can be seen as a strategy to manage one's vulnerable position. By helping someone in need, an inhabitant of Kemijen expects to be helped when he or she is in need of some assistance. *Gotong royong* in neighbourhoods like Kemijen is also used for solving joint problems in a neighbourhood.

There are several other practices used in Kemijen which can be seen as a kind of *Gotong royong*. Most of these practices have a particular aim. An important practice in Kemijen is *Ronda*. *Ronda* stands for night watch. In order to prevent crime most of the *RT*'s set up a schedule in which each man above 18 is participating. Normally *Ronda* is done every night. Another important practice in Kemijen is *Dasa wisma*. *Dasa wisma* refers to activities done to inform women living in the neighbourhood (Keasberry, 2002). Within the *Dasa wisma* women work together and organise activities for the neighbourhood. *Dasa wisma* in Kemijen is also used in the context of flooding. Activities are organised to provide useful information for women living in Kemijen. Eventually *Posyandu* can be seen as a common practice in Kemijen. *Posyandu* is set up in order to secure the well-being of people in the neighbourhood. This is done through activities like providing medicines, taking care of the elderly and monitoring children's growth. Especially after a flood *Posyandu* has an important role to help inhabitants of Kemijen to recover from the flood.

2.2. Conceptual framework

By elaborating on the different aspects having a part in the link between access to knowledge resources and social vulnerability a conceptual link between these aspects can be made. In this chapter the conceptual model, derived from the theoretical framework will be explained and displayed. After giving the conceptual model and explaining the different links in the model, the determinant factors in the model will be operationalised. By making these factors measurable, conditions to be able to collect data and analyse the data are created (Leroy, Horlings & Arts, 2009).

2.2.1. Conceptual model

In figure 7 the conceptual model, derived from the theoretical framework, is displayed. In this model the theoretical link between the access to information, knowledge and social vulnerability is made. Because these are not 'stand alone concepts' the research objects are placed in a framework of important factors explaining the connection between access to resources and social vulnerability.

First of all, the vulnerability framework provides a rich context to understand the link which is the object of the research. Social vulnerability in this research can be seen as an overarching dynamic concept influencing both important factors within this research. According to Füssel and Klein (2006)

social vulnerability in the vulnerability framework is regarded as an a priori condition of a household that is determined by socio-economic and political factors. The first arrow is drawn between social vulnerability and access to information. According to the literature study, access to resources, including access to information can be seen as an indicator of social vulnerability. On the other hand access to resources is partly determined by socio-economic and political factors which in turn have their influence on the social vulnerability of individuals and social groupings. This reciprocal relationship between social vulnerability and access to information is represented by a double sided arrow.

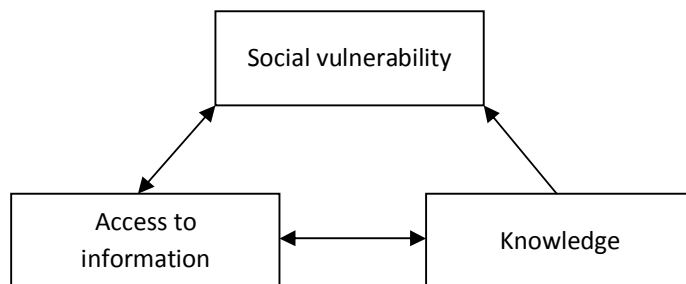


Figure 7: conceptual model

The next relation can be found between access to information and knowledge. A higher access to resources according to educational literature leads to more knowledge. The other way around knowledge has a positive influence on access to information. Through several ways as described in the first section knowledge can strengthen ones access to information.

The remaining arrow represents the relation between actual knowledge and social vulnerability. Since knowledge can be seen as one of the indicators of social vulnerability, the level of actual knowledge influences the level of social vulnerability. Generally speaking a higher level of actual knowledge will reduce the vulnerability of an individual.

2.2.2. Social vulnerability

As mentioned in the theoretical framework and also displayed in the conceptual model, social vulnerability provides the context of access to resources. According to the vulnerability framework, social vulnerability is caused by dependency on resources, absolute levels of infrastructure, relative and absolute poverty, and institutional and political factors. Since this research is focusing on the access to knowledge resources, the dependency on resources is further operationalised. Resource dependency can be divided is dependency on tangible and intangible resources. Tangible resources for example are the accessibility of food and other materials needed to secure a livelihood. The main intangible resource is the access to knowledge. Vulnerable people tend to have less access to resources, thus less access to knowledge and information resources.

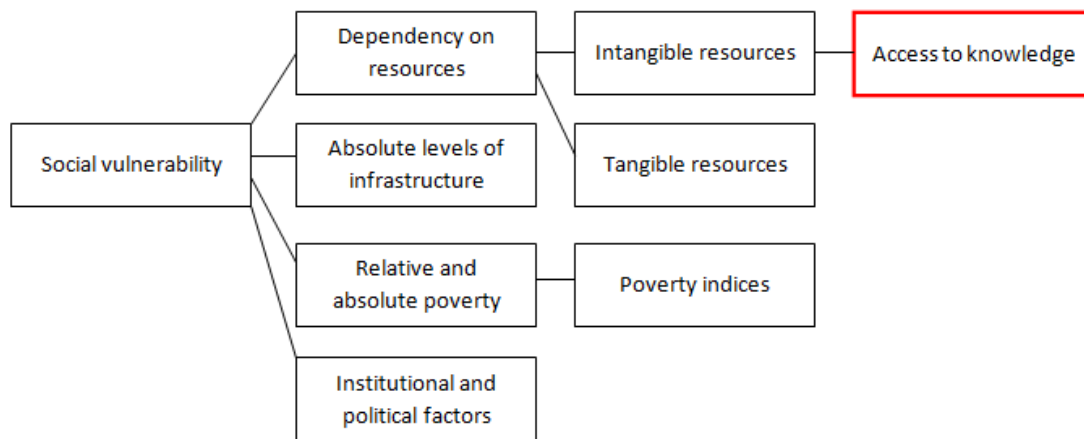


Figure 8: operationalisation of social vulnerability

2.2.3. Access to knowledge resources

Access to information (figure 9) in its turn can be divided in access to indigenous knowledge and access to knowledge on the causes of tidal flooding and effective adaption strategies, called ‘access to expert information’. These two knowledge sources can be seen as parts of the human and social capital of the vulnerable livelihoods. Indigenous information is gained through a social group. The position of a social community or an individual within this community determines the access to indigenous information. The access to expert knowledge is determined by the institutional context, which refers to the arrangements provided by local directors and the level of education an individual possesses.

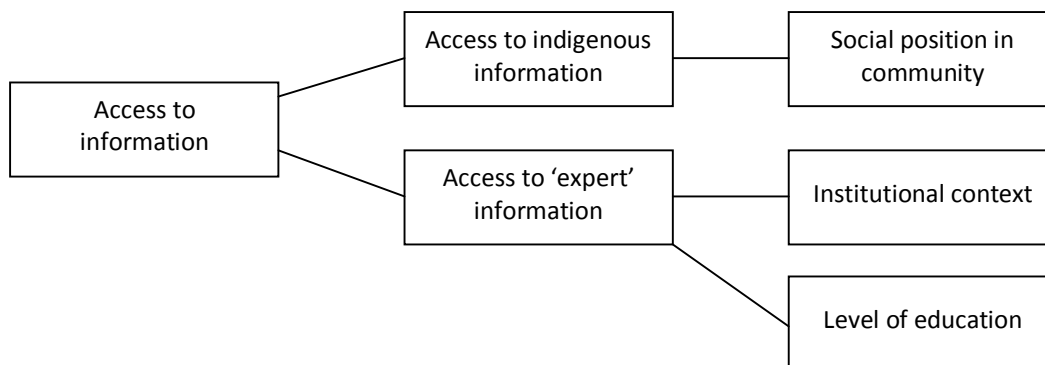


Figure 9: operationalisation access to information

2.2.4. Knowledge

Knowledge within the vulnerability context can be split into two variables (figure 10). At first knowledge about the causes of an external stress is identified. This knowledge is of great importance for local inhabitants of vulnerable areas to know what to adapt to. The second type of knowledge typified is the knowledge about adaption strategies. This practical knowledge provides answers to the question of how to adapt to certain external stresses.

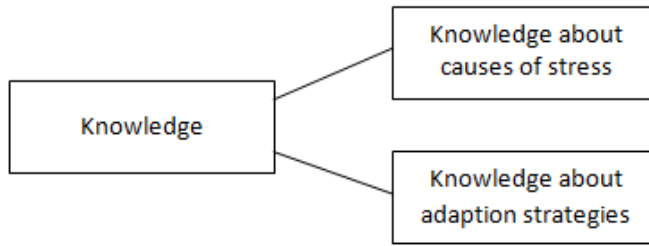


Figure 10: operationalisation of knowledge

Since the theoretical concepts as stated in the conceptual model are operationalised now, the theoretical framework can get alive in the following sections. In order to do this in a consequent and valid ways need to be found. Methodologies used will be elaborated and explained in the next chapter in order to use the operationalised concepts from this section.

3. Methodology

In the former chapter a theoretical and conceptual framework is given to provide a scope of analysis for the data obtained from the fieldwork in Kemijen. In order to make sure the data obtained is useful to answer the research question, a clear methodological approach is needed. In the first section the strategies used to obtain valid data will be discussed. Thereafter the limitations of the research will be appointed. The second section will discuss the treatment and analysis of data obtained. The strategy that will be used to analyse the data will be explained.

3.1. Research strategy

As already mentioned in the first section the vulnerability approach nowadays puts the inhabitants of areas facing external stress at the centre stage of the research, rather than the environmental hazard it selves. Since social vulnerability is socially differentiated, this research aims to describe how different people use their access to manage their vulnerable positions; a qualitative research is probably the most adequate way to answer take into account the social differentiation of vulnerability. Secondly by asking inhabitants use their knowledge and access an explanatory approach is the most sufficient way to answer the question. For this reason a qualitative approach is chosen over a quantitative approach.

Kemijen is chosen as the site for this research for several reasons. First of all Kemijen is located in the coastal area of Semarang. People living in this area are increasingly plagued by several types of floods. Secondly Kemijen can be seen as one of the less prosperous neighbourhoods in the coastal area of Semarang (Economic feasibility of Banger pilot polder, n.d.). Since the wealth in this area is relatively low, social vulnerability is likely to appear in this neighbourhood. By choosing a less wealthy neighbourhood practices of vulnerability reduction or reinforcement can be studied. Thirdly Kemijen is an interesting because new institutions are involved (Hadipuro, personal communication). The water board, also known as the polder board is having its influence in Kemijen. This institution will be described in the following chapter. The presence of this institution is interesting to research how institutions influence access to information and provide education.

In order to be able to answer the research question the different (sub-)questions (figure 11) will be addressed in the strategies described in the next sub-sections. The intention of the different strategies used is not to address these different research questions one by one. The aim is rather to combine different sub-questions in the different strategies. Some of the sub-questions will (partly) be answered within different strategies. By obtaining data of the same research question from different perspectives, the reliability increases and triangulation is enabled.

Research question: How do local inhabitants in Kemijen use their knowledge and access to information to manage their vulnerable positions?

Sub-question 1: What do inhabitants of Kemijen know about causes of- and strategies towards floods?

Sub-question 2: How do inhabitants of Kemijen obtain knowledge and information about floods and concerning strategies?

Sub-question 3: How do institutions influence the access to information for local inhabitants of Kemijen?

Figure 11: Research question and following sub-questions

3.1.1. Secondary data

Secondary data is used to investigate the knowledge provided by the local institutions. Policy and practices of information-sharing are researched by analysing regarding documents. By looking for documents and practices concerning the management of vulnerable positions towards flooding, the third sub-question is partly addressed. A part of this secondary data is presented in chapter 4. Besides addressing the third sub-question documents obtained are used to set up the interview guide (Appendix I).

3.1.2. Interviews with experts and institutions

Interviews with experts and representatives of institutions are held for three reasons. First of all these interviews provided information about education and information provided by local institutions. Secondly, better representations of the way people gain knowledge about causes of the water problems and strategies towards flooding are obtained. Third, experts and representatives of institutions provided insight in the role of the local practices and regional culture in how people obtain knowledge. The knowledge of the causes of- and strategies towards tidal flooding according to local institutions and experts are essential to confront the knowledge of inhabitants of Kemijen with the knowledge of experts and representatives of local institutions which are useful to answer sub-questions 1, 2 and 3. Four different experts with expertise on social vulnerability, land subsidence, access to resources and local institutions are interviewed.

3.1.3. In-depth interviews

Very important data sources in this research are the people living in Kemijen themselves. Since the objective is to place the vulnerable at the centre stage, the information provided by local inhabitants is of great importance. To obtain knowledge on how access and knowledge is used by local inhabitants in-depth interviews are held. By doing in-depth interviews social differentiation of vulnerability and the aim to explain the link with access and knowledge is taken into account. During the semi-structured interviews respondents are asked about their knowledge and information owned concerning floods, the way they obtain information and the way they manage their vulnerable positions (interview guide: Appendix I). Respondents are also asked about how they perceive the role of institutions. The interviews are needed to answer sub-questions 1, 2 and 3.

Conducting the interviews is done in close cooperation with my fellow students Anna Smits and Huub van der Zwaluw. All three researches concern social aspects of dealing with flooding and show overlap in the examined concepts. In order to make sure that all the topics required for the analysis were discussed, there was made use of an interview guide for the in-depth interviews. These three researches are integrated into one joint interview guide (Appendix I).

In order to take into account the social differentiation of vulnerability, respondents with different backgrounds are interviewed. The list of these respondents is shown in Appendix II. By selecting the respondents the following characteristics are used to obtain a mixed group of respondents: gender, age and housing situation. Since these characteristics are mostly observable, respondents with different strategies used are found.

During the fieldwork two key informants helped us to select different respondents. Initially one of the key informants tended to select the more wealthy people from Kemijen. This is mainly the case in interview #1 and interview #3. Afterwards this was no longer the case. In order to understand

people from Kemijen, a translator is used. To reduce the likelihood of misinterpretations notes about hand gestures and expressions are made during the interviews.

3.1.4. Basic household observations

Since social vulnerability is measured in terms of assets people own, an observation of the households of the respondents is important to have more insight in the physical assets of the given household. By making notes about the housing situation and equipments owned by a certain household, a more complete picture of the assets managed by a certain household is made.

3.1.5. Limitations

This research has certain constraints. Probably the most important constraint is time. Since the fieldwork is done in one month only, a limited number of inhabitants and experts are interviewed. This may lead to an incomplete view of strategies used by inhabitants of Kemijen. Therefore, the external validity of the interviews held is limited. Nevertheless these interviews definitely provide insight in how access and knowledge are used in the management of vulnerable positions.

A second constraint is the language barrier. Even though a translator is used, this barrier might lead to misinterpretations. Since the English translation is an interpretation as well, information might be lost. By doing observations this research aims to minimise the effects of the language barrier.

3.2. Research material

To be able to make a proper analysis of the data obtained from the fieldwork in Kemijen and the study of secondary data, the data needs to be interpreted systematically. To ensure this the interviews held during the fieldwork are recorded and set into transcript. Two of the expert interviews are not recorded for different reasons. Notes are made to reconstruct the interview afterwards.

After the collection of data during the fieldwork and the collection of secondary data, the data obtained is analysed and interpreted. For the interpretation of the data obtained a perspective needs to be chosen. As mentioned before, the objective of the research is to describe the access to knowledge and subsequent ways people manage their vulnerable positions, rather than explain the livelihood strategies used. By using this perspective the (social) context of the data obtained is of great importance. Therefore critical discourse analysis is used to interpret the data obtained. Within the critical discourse analysis, emphasis is put on the context and social interaction in the data: *'Critical discourse analysis engages in concrete, linguistic textual analysis of language use in social interaction'* (Jørgensen & Philips, 2010, p. 62).

According to Jørgensen en Philips (2010), discourse is both, influenced by 'the social world' and influencing 'the social world'. By taking in account social practices and the social context, a complete representation of the link between knowledge, access to information and social vulnerability for different individuals is provided. Using this perspective, the social differentiation and the social context are addressed and the actual situation of people living in coastal zones is taken into account. By doing this the ways people use to manage their vulnerable position can be explained properly.

The methodological framework outlined above enables the presentation of the data obtained in chapter 4 and 5. Strategies described in this chapter will be used to describe and analyse the data in the following chapters 4, 5 and 6.

4. Institutions in Kemijen

In order to understand the structures and practices in Semarang it is important to know more about the role of different institutions in Semarang. As mentioned before, institutions should be interpreted broadly. Both governmental structures and local practices like *Gotong royong* have their influence on how people cooperate and share their knowledge in Kemijen. In this chapter the a description of the role of local practices and other institutions will be provided.

4.1. Local practices

Since neighbours are of great importance within the Indonesian culture (Keasberry, 2002; Iswari, personal communication; Hadipuro, personal communication) RT's have an important role in social live and daily practices of people living in neighbourhoods like Kemijen. Most of the RT's in Kemijen organise regular gatherings in which issues concerning the neighbourhood are discussed. Although the RT structure seems to be an effective mean to share and provide knowledge the RT gatherings have a negative influence on the vulnerability of female headed households. Hadipuro (personal communication) gives a striking example how the restricted access of women in RT meetings can obstruct female headed household to manage their vulnerable positions:

If there's a possibility for certain household to obtain funds to be connected to a water supply company, this information is usually provided through RT meetings. Since men are only invited to these gatherings, female-headed households won't get any information. Because the distribution of information about support programs by the government is distributed through the RT meetings female headed households tend to be more vulnerable.

Even though women are excluded from the formal RT meetings, these structures empower people to manage their own neighbourhood. By splitting up different neighbourhoods much responsibility is given to the local communities (Iswari, personal communication). The RT can be seen as an organisation 'doing the work' in the neighbourhoods. Each RT has a monthly meeting to discuss the problems regarding the territory they live in. Because people within the RT's of Kemijen have a common enemy they are willing to cooperate to defeat this enemy. Besides empowering people to join the fight against the water RT's also have influence on the daily lives of people. *Gotong royong* is often applied within the RT's. The RT helps people to renovate their house, writing a letter of admission for their children to go to school and assist people to relieve themselves from debts. Nevertheless the public interest always comes first:

Within the RT still the majority decides. This corresponds closely to the Indonesian value of putting the community in the first place. Because of the great importance of 'the public' individual households sometimes become victim of their own RT. Since water is always going to the lowest point heightening the road for example might worsen the situation of individual households. (Iswari, personal communication)

Even though the public interest is having priority in Javanese neighbourhoods, individuals in Kemijen sometimes suffer from other households.

When rich people heighten their floor, they make the poor people become more vulnerable. When a household gets surrounded by heightened houses, the water will get into their house more easily. So by heightening a house, the livelihood of the neighbours might become disrupted. (Hadipuro, personal communication)

According to several respondents the *PKK and RT* are important to spread information on how to deal with water problems. Information about what to do after a flood and information on how to prevent diseases is seen as very useful by several respondents. On the other hand some of the respondents do not see any link between these practices and the water problems Kemijen is coping with. According to them the *RT, PKK* and other local practices only focus on problems regarding the territory of which the water problems are not a part.

Most of the respondents from Kemijen tends to say that people in the neighbourhood do not work together before, during and after the floods. When they are asked about *Gotong royong* several practices of mutual and reciprocal assistance are appointed. Through *Dasa wisma* a public kitchen is set up just after a flood, people from flooded houses are offered to stay in another house and money is raffled among the most vulnerable households.

By some of the respondents *Ronda* is seen as an important practice regarding the water problems in Kemijen. Even though *Ronda* is originally set up to prevent the neighbourhood from crimes, this night watch functions in some *RT's* also as a kind of flood watch. When the water from the sea or from the river is rising, people use wooden sticks to hit against the electricity poles to warn people living in the neighbourhood. By using *Ronda* people have some time to prepare themselves and store some of their equipment in higher places. Also the sound system of the musk is often used to spread information concerning the floods. The use of *Ronda* as a warning system for floods in Kemijen seems to be strongly differentiated. Some of the respondents do not see any link between *Ronda* and flooding and in some other *RT's* *Ronda* doesn't exist at all. According to some of the female respondents interviewed 'men are too lazy to do *Ronda*'.

4.2. Other institutions

One of the institutions in Kemijen is the local government. In 2010 a plan is set up by the Asian cities climate change resilience network (ACCRN, 2010) to improve the resilience of people living in Semarang. Within this report little attention is paid to how land subsidence and subsequent problems in low-lying areas of Semarang could be reduced. General strategies to increase the resilience of the city are given. One of these strategies is training and education of people to improve their resilience:

Human resource development through formal and informal education and training public and government officials become an important strategy in climate change adaptation. Knowledge and skills obtained will facilitate implementation and encourage the success of the program and climate change adaptation action. One intervention that can be proposed is: Mainstreaming climate change into education curricula. The goal of this action is public will have a more understanding on the climate issues, impacts, and challenges. The content of education material and methods depend on different education level, begin with elementary school to university. (ACCRN, 2010)

According to different stakeholders in Kemijen the strategies used by the government have a limited scope:

About two years ago the government started a campaign telling people not to withdraw groundwater. But it is an empty message. You need water. Furthermore the campaign only lasted for a short time. From the government there is no education, only communication. There is a lack of knowledge at the government. They prefer a campaign over real education because it is cheaper and easier. (statement done by respondent from Kemijen)

Even though the campaign of the government didn't seem to be very effective, the local government is also involved in Kemijen in other ways. Through RW's and RT's funds are provided for communal interests. The local government is an important stakeholder in the funding of the heightening of the roads, providing healthcare through *Posyandu* and the Banger Polder project in Kemijen.

4.2.1. Polder board

Another important institution in Kemijen is the polder board. Since the aim of the Banger polder pilot project is to make the local inhabitants of Kemijen finance the maintenance of the polder themselves awareness raising and education is important in determining the success of the pilot polder:

One of the success key of being Polder Board is the ability to generate and maintain the trust from its stakeholders. Banger case shows that stakeholders' willingness to contribute (support) requires a visible result of a Polder System. (Iswari, 2008.)

In order to be successful in generating and maintaining the trust of different stakeholders in the Banger polder several initiatives have been executed. Since people living in Kemijen will need to pay for the maintenance of the polder once it is finished, local inhabitants are seen as important stakeholders in the project. To raise the awareness and sense of urgency for building a polder, the polder board arranged several activities are set up:

Quiz competition: During the quiz several questions were asked about how to behave in relation to the floods. By asking this people understand better why the area they live in has become a polder.

Role-play: Different scenarios were set up. People were asked how to behave in the role they played regarding the floods. The aim of this role-play was to communicate about good ways to behave towards floods.

Cleaning competition: In order to raise awareness of the so-called bad habit, a cleaning competition is set up by the board.

Photo competition for students from secondary school: to raise awareness among students they needed to make pictures of the polder and answer questions about what the polder is used for.



Figure 12: winners of cleaning competition (left) and roleplay (right) in Kemijen (source Iswari, Water board)

Besides steps taken by the water board, also local initiatives have emerged over the past years. For example the Banger festival was organised short after the start of the polder project. This festival was organised by several prominent inhabitants of Kemijen and a youth organisation. During this festival a bazaar, rowing competition and discussions were held to raise the local awareness and to encourage local people to participate in the project.

Even though the polder board is taking several steps to raise the awareness and convince local inhabitants of Semarang a polder is needed, local inhabitants seem to be suspicious. For this reason the willingness to pay for the maintenance of the polder is limited.

The community's willingness to pay for the operational and maintenance of Banger Polder is valued at 1100 Indonesian rupiahs per household per month. This value is much less than their yearly expenses on house renovation due to frequent inundation by flood and tidal flood. This condition pertains because the community's awareness to do a collective action is still low. Besides, the community is not very sure whether or not the development of Banger Polder will significantly solve the problems of inundation by flood and tidal flood. (Iswari, 2008.)

A significant part of the respondents from Kemijen claimed they don't know anything of the polder Banger. The people claimed to don't know about the pilot polder can be described as the more vulnerable households. Consequently these respondents claimed to have no money to pay for the maintenance of the polder. On the other hand a group of respondents claimed to know about the polder and the reasons the polder is built. These respondents were willing to pay for the maintenance of the polder.

5. Livelihood portraits: four managers of their vulnerable positions

Four different stories of how people living in Kemijen manage their vulnerable positions will be elaborated¹ in this chapter. By doing this the vulnerable people are placed in the centre stage of this research. The descriptions of these different individuals will be used to analyse the vulnerability and access to information in Kemijen. In order to take into account the social differentiation, four different vulnerable managers are chosen. Within these descriptions remarkable contradictions may occur. In order to stay close to the answers given by the respondents the contradictions are included. In chapter 6 some attention will be paid to these contradictions.

5.1. Mrs. Septi

Mrs Septi is one of the inhabitants who are continuously confronted with flooding. On the 10th of April 2013 after a few dry days she still had a layer of water in her house (figure 13). Together with two of her three children she is living in the house shown on the picture below (figure 13). Originally Mrs Septi grew up Plombokan where she finished elementary school. Plombokan is a village close to Semarang. Since her husband originally comes from Kemijen, Mrs Septi moved to Kemijen when she got married. 'I live in Kemijen for sixteen years now.'



Figure 13: housing situation of Mrs. Septi

When talking about flooding in her area Mrs Septi just seems to face the situation as it is. 'I cannot do anything about. I just sell snacks to be able to make a living. I need money to enable my children to go to school. Because of the permanent water in my house I have rash on my feet.' Since the pump of Mrs Septi's RT is not working anymore, the flood in her house increased. The RT Mrs Septi is living in does not have the money to buy a new pump or to repair the current pump. 'We need money from the government to get the water out of this area.' For three years Mrs Septi's house is continuously flooded like it is now. Since her house is flooded she is not working together with

¹ In order to safeguard the anonymity of the respondents, all names used in this chapter are fictitious.

people from the neighbourhood anymore to recycle working papers. She needs to earn money by making snacks.

According to Mrs Septi there are two reasons for the flooding in her area. 'First of all, the high tide is coming from the river. Secondly the bad habit of just throwing garbage away is one of the major causes of flooding in this neighbourhood.' Because Mrs Septi sells her snacks in different places in the neighbourhood she often comes to the river. 'If the river is full of water it means the flood will come. It is like a sign for me.

'Actually I don't know where the water is coming from. I just check the river regularly to see if the water is coming. I don't remember the last flood. My house is always flooded. I feel very sad about that.' One day Mrs Septi wants to have a house free from flooding, but again she emphasises she doesn't have enough money to move or to heighten her house. Mrs Septi claims to know nothing about the project of the Banger polder as well. 'I never heard of it.' She also doesn't know anything about the maintenance fee people living within the polder need to pay. 'I just sell snacks and never go out of this area. What can I do? I don't have enough money.' She also never saw the new pump building of the Banger polder.

Although Mrs Septi claimed she cannot remember the last flood she comes up with a flood she experienced about three weeks ago. The water was too high to stay within her own house, so she moved to a higher building. 'That's all I can do during a flood.' According to Mrs Septi people from the neighbourhood help each other during the flood. Some people offer her a place to stay during the flood. 'Last time my neighbours brought back my bowl which was flowed away.' After the flood people just clean their own houses. 'Besides removing the garbage from her house I cannot do anything. Because my house is always flooded that is all I can do.'

'I am having a good relationship with the people living around here. In my family I only have contact with my sister. She is living in Plombokan. I only go to my sister with id-al-fitr. Because she lives very far away (1 hour by local transport) I only go there once a year.' Because Mrs Septi doesn't live close to family neighbours are very important to her. We just help each other within this RT. 'Because I have a good relationship with the people around here they offer me to stay at their places when the area is getting flooded. 'I also join the PKK. In the PKK we share information and save money together. When my husband was still alive, I also used to loan money from the PKK. I no longer do, because I cannot pay back my debts anymore.' Nevertheless she still pays 6000 Indonesian rupiahs a month for her membership of the PKK.'

By asking Mrs Septi about local practices of working together she immediately focuses on *Ronda*. 'There is no *Ronda* anymore. When there was *Ronda* motorcycles and other belongings were stolen.' Since the *Ronda* stopped no motorcycles are stolen anymore². Men living in this RT are too lazy to do *Ronda*. It is a social problem.' Mrs Septi doesn't know really about the worth of *Posyandu* and *Dasa Wisma* for her. She doesn't know it is also meant for older people. 'Sometimes free medicines are provided by *Puskas mas*.' In *Puskas mas* the government provides free medicines. According to Mrs Septi it does not really happen on a regularly base. 'I am also very happy about *Gotong royong*. I can help and be helped by other people because of *Gotong royong*. *Gotong Royong* is especially meant

² Even though this doesn't seem to be logical, the translator ask about this twice and both times Mrs Septi confirms this statement.

for if someone died or someone is ill.’ According to Mrs Septi people help each other in this kind of situations. She doesn’t really seem to see a link between *Gotong Royong* and the water problems in her neighbourhood. ‘Just *Gotong royong* it is. Nothing within the *Gotong royong* has changed. People from the RT still clean the environment once a month.

5.2. Mr. Sartono

On the 18th of April 2013 Mr Sartono (65 years) was sitting in his front porch. ‘Actually this is not really my house. I moved here because I couldn’t stay in my former place anymore.’ Mr Sartono points to the house next door (figure 14). Because his house sunk to deep he decided to move in with his children. Now he is living in a small house of stone together with his wife, two daughters, a son-in-law and one grandchild. Until a few years ago Mr Sartono used to be a construction worker. ‘I am jobless because I have a disease.’



Figure 14: Mr. Sartono's former house

Last night Mr Sartono experienced a flood for the last time. Because of the pouring rain the area he lives in got flooded. ‘The rain was there for just less than one hour, but it was already below the window of the porch.’ Because the pump in the RT is not operating, the water cannot be pumped out. This area is having two pumps. One of the pumps uses fuel and the other is electric. Because the electricity did not work last night the electric pump was not active. Since the pump operating on fuel is not very effective the area got flooded. He was really worried last night. In order to save his equipments he put them in the higher places last night. The day after Mr Sartono still had a small layer of water on his floor. ‘Right now the water is coming again; the channels are getting flooded again’ (figure 15).

According to Mr Sartono the floods in his area got worse over time. ‘The last time I experienced a severe flood was last March. Because the high tide and pouring rain occurred at the same moment

the flood was really intense.’ Besides appointing these events, Mr Sartono does not seem to be happy with the Polder Banger.



Figure 15: 'The channels are getting flooded again.'

Mr Sartono distinguishes between different causes of the water problems in Kemijen. 'Maybe the ground is getting lower and lower every year. I don't know why, but if you want to see, you can have a look at the bridge over there. A few years ago the bridge was 1 meter higher. Now the bridge is almost at the same level as the water in the river. Some years ago fisherman used to go underneath with their small boats. Now they cannot go underneath anymore. I know by experience that the ground is getting lower and lower each year. The ground is getting lower, because the ground was taken.' Another cause of land subsidence according to Mr Sartono is the high quantity of building near the seashore. Besides land subsidence there are also other major causes of the water problems in Kemijen in Sartono's vision. 'Because of the global warming ice in the pole is becoming water which leads to a rise of the sea level. Another major cause is the bad habit of people living in Kemijen. Since people from Kemijen just drop their garbage everywhere the water is blocked.'

Mr Sartono derived his knowledge about water problems in Kemijen from several sources. First he mentions intelligent people³. By talking to these people he obtains knowledge of land subsidence and floods in his neighbourhood. Besides these intelligent people Mr Sartono claims to know a lot about global warming from the magazines. Although Mr Sartono seems to have more than average knowledge about land subsidence and major causes, he doesn't share this knowledge with people from his neighbourhood or leaders of the local community: 'Because the leader of the RW is smarter than me I don't tell him about the things I know.'

Mr Sartono doesn't really seem to know if his knowledge is helping him to prevent his family from the floods. 'I am really sad, especially about my own house. I don't have money to build a new house. We regularly put some sand in the house, that's cheaper.' According to Mr Sartono the only thing he

³ Mr Sartono did not give a clear definition about 'the intelligent people'

can do now is keep watching the water. When the water pump is not operative Mr Sartono will call the pump officer and ask him what to do. As the water level rises he goes back to save his equipments by putting them on the chairs. Once the water comes to the chairs he cannot do anything but praying. If it is god's will, it will happen. 'I just stayed in hospital for two weeks. Because I'm ill and do not have enough money I cannot heighten my house.' Lack of money is also a reason for Mr Sartono to stay. If he had the abilities to move he would go back to his original hometown Solo. On the other hand he also wants to stay in Kemijen because he feels comfortable in his neighbourhood and most of his close family lives in Kemijen.

'Because flooding is normal here I don't help other people to protect themselves.' Nobody is helping him either. 'Everyone is having their own difficulties, so people focus on their own houses.' Because floods have become a routine in this neighbourhood people do not really help each other. 'It is just a part of daily life, we don't know any better. Actually no one is really helping me, but I still care about the others.'

Family and neighbours are the most important for Mr Sartono. If he is having any trouble he asks help from them. 'Especially because I'm originally not from Kemijen I need my neighbours a lot.' He also used to help people from his RT. 'Some years ago I used to be the leader of this RT. That is why many people come to me and ask for my opinion. People ask me for solutions concerning the heightening of the roads in this RT.'

According to Mr Sartono local practices are very important. 'Problems can be solved in these organisations.' *Gotong Royong* for example provides transport for people in need to go to the hospital. 'I was just using a paddy cab, the traditional transportation to go to the hospital. 'Because this area is safe, Ronda doesn't exist anymore. Only during Ramadan when people save a lot of money men are watching the RT to prevent the area from theft.' According to Mr Sartono the increasing water problems in the area contributed to the cooperation through practices as *Gotong Royong*, *forum RT* and *Ronda*. 'After flooding people work together to collect the garbage.' Besides cleaning the environment people from the RT also help to take care of the water pump. Local practices contribute to the protection of the neighbourhood. Besides this, the practices also provide safety and solutions for other kind of problems in the area.

5.3. Mrs. Sutarni

Another inhabitant in Kemijen is Mrs Sutarni (interviewed on the 17th of April 2013). Mrs Sutarni is an elderly woman of 70 years old living together with her husband, her son with his wife and one grandchild. Within their neighbourhood they are one of the few living in a heightened house. Before her husband retired, he used to work in an American furniture company. Mrs Sutarni used to do the household at that time. Now she is also the head of the *Posyandu* in her neighbourhood. *Posyandu* is meant to take care of children's health by providing medicines and monitoring growth.

According to Mrs Sutarni there are three kinds of water problems in her Kemijen. 'Because this is a low-lying area the water from the river can come easily. The second reason is *rob* (high tide). When the sea level is getting higher, the water flows into Kemijen. The third water problem is the heavy rain.' Because the RT Mrs Sutarni lives in is very poor, people are very vulnerable to- and easily affected by floods. 'Because this RT is very poor we just started to heighten the road' (figure X). As displayed on the picture even in dry periods parts of the road are flooded. 'Other RT's already

heightened their roads.’ Most of the funds necessary for heightening the road are provided by the local government.

In Mrs Sutarni’s opinion the water problems in Kemijen are less severe than some decades ago. In the 70’s she experienced her worst flood. The water was up to 2 meters. Because the dikes preventing the neighbourhood from floods were broken the area was seriously flooded. ‘Since the government widened the rivers, the floods in this area are less severe. Because this area is protected by the railway which functions as a dike the water won’t get higher than 50 centimetres. ‘Personally I am not really influenced by the floods, but the lower houses are already flooded after some heavy rain. Because these people are poor, they cannot afford to protect themselves.’



Figure 16: road is getting heightened in Mrs. Sutarni's RT

According to Mrs Sutarni the major problem is the water coming from the sea (*rob*). ‘Because the rain comes seasonal it is not a major problem in this area.’ Mrs Sutarni knows about the *rob* because of her son. ‘My son is working in the harbour and uses to bring schedules with meteorological predictions about high tide. Because the schedule corresponds with the real situation in Kemijen, this schedule is very helpful for her.’ When her son is telling her about the predictions of high tide Mrs Sutarni uses to tell her friends and neighbours to prepare for the next flooding so they have some time to put their equipment in higher places.

‘The last flood I experienced was last Friday. Because the pouring rain occurred for several hours the street and low houses in this area were flooded. Since I live in a heightened house (figure X), my house was not flooded.’ For Mrs Sutarni the floods are just a part of daily life, ‘it is just normal for us’. ‘Water coming from the pouring rain will just disappear very fast; it is just a part of daily life, just routine.’ When asking her about feelings of safety and vulnerability Mrs Sutarni keeps emphasising the flood is just common. Since she lives in a heightened house she just feels safe and doesn’t take any measures to protect her household, family and belongings. ‘The only thing I do is informing friends from the neighbourhood to prepare themselves.’ Besides warning people from the

neighbourhood she knows she needs to save money to heighten her house approximately every 10 until 12 years.

Initially Mrs Sutarni thinks she is not doing anything besides warning for people living in her RT. 'I cannot help after a flood, because their houses are not like this one. No ceramics, but just sandy ground.' Eventually Mrs Sutarni comes up with another way the neighbourhood is helping the poorest. 'After a flood some people from this RT collect money and raffle it amongst the poorest people living in this RT.'

Mrs Sutarni is very content with her family. 'I really live in harmony with everyone from my family. People from the neighbourhood are looking at us, because we are an example for other families living in this area.' Mrs Sutarni is also glad with her husband and with her children. 'Because they are all very cooperative we live happily together.' According to Mrs Sutarni she is seen as an old wise woman. 'People with problems are coming to me to ask for solutions. Actually I do not have a certain purpose for my friendships within this neighbourhood. Just because I have an important role as the head of *Posyandu* in this area I am well known in this area.' Mrs Sutarni really likes to help people around her. 'I just feel like I need to help other people. I like to help everyone, not only the children.' While gesturing her desire to help is coming from the inside Mrs Sutarni points out her desire to help is coming from the heart. 'I don't care about religion or ethnicity. I just want to help the people around.'



Figure 17: living in a heightened house

Local practices of helping people in the neighbourhood are very important for Mrs Sutarni. 'I love local organisations, because I want to help people here.' Mrs Sutarni is the leader of *Posyandu*, *Dasa Wisma* and *PKK* which she seems to refer to when saying she loves local organisations. 'Because I want to help the people around, these organisations are very important to me.' By asking Mrs Sutarni about examples of these local practices she emphasises her role in the area: 'Everyone is coming here when they have a problem and ask me for solutions. Sometimes people need some money, so I will collect money and give it to them. Sometimes I also go to visit people at their houses. When someone is sick I will go there and help to collect money to bring the sick to the hospital. Most of the times the *PKK* is also contributing money to take someone to the hospital.' *PKK* stand for welfare, family and education.

According to Mrs Sutarni social norms in the neighbourhood have been changing over the past decades. 'People used to work from the heart. Now the only thing they think about is money and time. People do not want to spend any money for local practices.' In Mrs Sutarni's opinion these changes do not have anything to do with the water problems the area is dealing with, even though the water problems in the area got less worse according to her. Nevertheless practices like *Gotong Royong*, *Ronda* and *Dasa Wisma* are important in the context of flooding. 'When the flood comes, they warn people for the coming water. That is how *Ronda* is useful to help household to prepare for a flood.' After the floods, because of *Dasa Wisma*, people from the neighbourhood use to make a little public kitchen to cook for everyone living in the neighbourhood.' Thirdly *Posyandu* is very important in the opinion of Mrs Sutarni in the context of flooding. 'Especially after floods people from the neighbourhood come to ask for medicines. *Posyandu* happens monthly in every RW on the 20th.

The local practices and the role Mrs Sutarni is having in her neighbourhood are important reasons for Mrs Sutarni to stay in her neighbourhood. One of her children offered her some years ago to move to them, because they live in a higher part of Semarang. 'Actually I really don't want to go to that elite area, people over there are very individualistic.'

5.4. Mrs. Sugiyasi

Another woman strongly influenced by the floods in Kemijen is Mrs Sugiyasi (interviewed the 17th of April 2013). Together with her husband and two children this young woman of 28 years old is living in a wooden house with a floor of sand. Her house is located near a big pond full of garbage (figure X). Since Mrs Sugiyasi is married she is used to do the household and take care of her children. When Mrs Sugiyasi got married in 2008 she went to Kemijen, the place her husband originally comes from. Mrs Sugiyasi went to elementary school in the neighbourhood she is originally from.

'The worst flood I ever experienced was last March. Until that time we also used to live annex which now functions as a kitchen.' In Mrs Sugiyasi's opinion the main cause of the floods is the high sea level. 'The sea is getting higher and higher because of the growing amount of boats in the sea.' The last flood was also caused by a several other reasons. 'My husband told me the dike was broken at that time. People around me also told the water coming from the rain was a cause of the flood in March.' Even though the worst flood she experienced was last March Mrs Sugiyasi thinks the floods are less worse now. 'When I moved here in 2008 the street in front of my house was always flooded. Now the road is heightened. Actually I don't really know where the money comes from. The only thing I know the road is higher now.'

Mrs Sugiyasi feels very sad when she is thinking about the floods. 'I don't feel well then. Because of the floods my feet are hurting. When my house is flooded, sand is getting under my nails which hurts very badly.' Besides the physical consequences of the flood Mrs Sugiyasi also feels sad because she is afraid of a tsunami. 'Since I am afraid I tsunami will come, I am afraid to stay in this place.' Mrs Sugiyasi doesn't really know what she can do when the flood comes. 'Once the floods are getting worse, I just run away with my children. Actually I don't know how, but I already arranged some planning to go back to my original place.' When the floods are less severe Mrs Sugiyasi tries to save her belongings by putting them on the bed. 'I usually put some clothes in the bed and put the electronics temporary on the table. Most of the times floods won't get that high. People from the neighbourhood do not really help each other to protect each other. Everyone is just focused on their own household' Mrs Sugiyasi claims she never heard any information about how to prepare for a next flooding. 'The only thing I know is when the water is coming. I know it by experience. I do not participate in any organisation dealing with flooding; I prefer to stay at home with my children.'



Figure 18: pond near Mrs Sugiyasi's house

Since Mrs Sugiyasi is not originally from Kemijen her neighbours are very important to her. 'If I have a problem, I would like to have help from my neighbours, not my family. My family members cannot really help me, because they live far away.' An example of the help Mrs Sugiyasi got from her neighbours she mentions the help she got when she needed to give birth. 'When I needed to give birth to one of my children my husband was working in Jakarta. At that time the neighbours came and brought a doctor.' Eventually she gave birth in the house she is currently living in.

According to Mrs Sugiyasi local practices are very important to her. 'Especially *Posyandu* is important, because they take care of the children by providing medicines and monitoring their growth.' Besides *Posyandu* Mrs Sugiyasi is not really involved in other local practices. 'Because my children do not want to stay home with my husband, I am not involved in the *PKK*.' Mrs Sugiyasi's children are always near her. 'I take them everywhere.' Officially there is no *PKK* in the *RT* of Mrs Sugiyasi, but they also have gathering like *RT*'s have. 'I do not go to these meetings.' Within this

neighbourhood association money is collected. 'If fate is on your side, you win the money.' In Mrs Sugiyasi's opinion local practices contribute in the protection of the neighbourhood against the water problems. '*Gotong royong* for example contributed to carry out the heightening of the road in this *RT*. *Posyandu* is also very important. They give free medicines, especially after a flooding.' According to Mrs Sugiyasi *Ronda* does not have anything to do with floods. '*Ronda* is just meant for the safety in the neighbourhood, not for the water problems.'

'Actually I wouldn't mind leaving Kemijen, but my husband really wants to stay in this area.' If it was up to Mrs Sugiyasi she would move back to the town she is originally from. 'I want to be free from flooding.' Because the husband of Mrs Sugiyasi is having a job and some friends in Kemijen, they don't move to another quarter.

Further reading

Within chapter 4 and 5 practices used by institutions and local inhabitants to intervene in social vulnerability are described. These descriptions of institutions and personal management of social vulnerability are outlined in order to look for the link between knowledge, access to information and social vulnerability. In the next chapter this relationship will be examined.

6. Practices of vulnerability reduction: Analysis

'Maybe by saving money for my children to go to school, one day we can be free from floods.' (Quote by respondent from Kemijen)

As proved by the quote above inhabitants of Kemijen have certain strategies to manage their vulnerable position. Within this chapter these practices described in chapter 4 and 5 will be analysed and interpreted. In order to do so, the theoretical framework will be confronted with these results. By doing this knowledge will be obtained about how inhabitants of Kemijen use their access to information to manage their vulnerable positions.

6.1. Local knowledge, sources and strategies

Within Kemijen different kinds and sources of knowledge are found. These different sources and strategies will be elaborated in this section.

6.1.1. Knowledge derived from own experience

When asking respondents living in Kemijen about the floods and causes mostly they come up with reasons derived from their own experiences. These experiences often are based on individual observations. Mr Sartono for example found out by himself the ground might be getting lower and lower each year:

'Maybe the ground is getting lower and lower every year. I don't know why, but if you want to see, you can have a look at the bridge over there. A few years ago the bridge was 1 meter higher. Now the bridge is almost at the same level as the water in the river. Some years ago fisherman used to go underneath with their small boats. Now they cannot go underneath anymore'

Many other examples and arguments for the water problems are based on personal observations. Like several other respondents Mrs Septi knows the water is coming when the water level in the river is getting higher. Because Mrs Septi experienced floods before after the water level in the river was getting high she knows she needs to prepare for a probable next flood. On the other hand Mrs Septi knows she needs to safe her equipments because when her house will be flooded her belongings will become damaged if she doesn't store them in a higher place. By combining her knowledge about floods and her knowledge about measures to prepare for a flood Mrs Septi reduces the impact of a probable flood for her household. Even though this strategy seems to be very basic, it is the most important strategy used by vulnerable households to reduce the impacts of flooding. Since the strategy used by Mrs Septi is focused on the short-term, storing equipment in a higher place can be seen as a coping strategy. By temporarily storing belongings in a higher place in order to safe them, no adjustments or sustainable solutions have been made.

A more long term solution to prevent a household against the water problems in Kemijen is done by Mrs Sutarni. By heightening her house she doesn't need to take short-term solutions like storing her equipment in higher places:

I know I need to save money to heighten my house every 10 until 12 years.

Since Mrs Sutarni experienced water in her house a several years ago she knows from experience she needs to safe money in order to prevent her household from a similar situation. By heightening her house Mrs Sutarni is using adaption strategies to prevent herself from flooding. Even though she claims she doesn't need to do anything to secure her livelihood she needs to safe money to heighten

her house in the future. In this sense heightening the house is not a sustainable solution to prevent a household from flooding.

Mr Sartono also used more structural measures to prevent his household from flooding. Since he experienced floods in his former house he adapted by moving in with his family. Because of the worse circumstances and the limited possibilities he had, Mr Sartono decided to move in with his children. In that sense, the adaption strategy used by Mr Sartono is experience-driven.

A final example of knowledge derived from personal experience is given by a female respondent also quoted at the start of this chapter:

Maybe by saving money for my children to go to school, one day I can be free from floods

Since she knows a significant part of the more wealthy people have higher education, she also invests in her own future. Even though the short-term might suffer from this investment, this strategy might improve her social vulnerability significantly.

6.1.2. Knowledge and information through other inhabitants

Another important source of information and knowledge in Kemijen are the inhabitants themselves. Within the interviews several practices of how people obtain information through neighbours, family members and friends are named. Some of these practices are directly related to institutions and will be elaborated in sub-section number three. An example of knowledge obtained through family is given by Mrs Sutarni.

My son is working in the harbour and uses to bring schedules with meteorological predictions about high tide. Because this schedule corresponds with the situation in Kemijen this schedule is very helpful to me.

Since Mrs Sutarni is informed through high tide predictions she uses to warn people from her neighbourhood living in low-lying houses. By doing this Mrs Sutarni also functions as a conveyer of information. Besides being informed she helps people living in her neighbourhood by giving them extra time to prepare for a flood. Even though the information provided by high tide predictions from the harbour are a bit more sophisticated than the information mentioned previously, the high tide predictions do not lead to long term solutions against flooding. Providing high tide information in order to prepare for flooding in this sense can be seen as a coping strategy.

Even though spreading information seems to be a common practice in Kemijen, not all information is passed on. Mr Sartono for example feels he is not in the position to tell about his knowledge to the leader of the RW. Although he knows more about flooding and land subsidence than other respondents he doesn't share his knowledge with people in the neighbourhood or local leaders.

Because the leader of the RW is smarter than me I don't tell him about the things I know.

By not passing the information and knowledge to leaders and members of the local community possible strategies towards the floods cannot be performed. Besides that, not passing the information can be seen as a coping strategy. Since Mr Sartono is busy in coping with flooding he doesn't really think about adaption or mitigation strategies. The knowledge owned by Mr Sartono doesn't seem to have a positive effect in how he manages his vulnerable position.

Another example of knowledge obtained is given by Mrs Sugiyasi. She is informed by both, her husband and people living in her neighbourhood. They provided her basic information about causes of flooding in Kemijen.

My husband told me the dike was broken at that time. People around me also told the water coming from the rain was a cause of the flood in March

Probably since Mrs Sugiyasi is always staying with her children she doesn't know much about the floods by her own experience. Because she is just living in Kemijen for 4 years she is having less experience with floods than the people around her. Furthermore Mrs Sugiyasi might have been too uncertain to give her personal answer.

6.1.3. Individual reasoning

A less appointed category of knowledge is knowledge made up by the people themselves without any necessary observation. An example is the reason for sea level rise according to Mrs Sugiyasi:

The sea is getting higher because of the growing amount of boats in the sea

Probably this reason is set up by logical reasoning of Mrs Sugiyasi. When there is a bowl of water and someone is putting some stones in it, the water level will rise (Seminar Kemijen, 23th of April 2013). Since Mrs Sugiyasi only went to elementary school, this might be a reason why she made up a 'non-rational' reasoning like this.

6.1.4. External knowledge

Next to the local knowledge, some of the inhabitants of Kemijen are also informed and educated by external sources. Some of these external sources are using local practices like *RW's*, *RT's* and *PKK* to spread the knowledge. These practices will be discussed in the second, following sub-section. Furthermore, some external sources provide knowledge and information directly to inhabitants of Kemijen. Since a small part of the inhabitants of Kemijen are working in the harbour, knowledge like prediction schedules are passed to the local communities. Just a few of the respondents mentioned about sources like newspapers, magazines and other media. Mr Sartono is one of the respondents who obtained some knowledge and information through media and other external sources:

By talking to intelligent people I obtain knowledge about land subsidence and floods in this neighbourhood. I also know a lot about global warming and from the magazines.

Contrary another respondent claimed no knowledge or information is provided through media. According to this respondent the media don't come up with knowledge people in Kemijen doesn't know about.

Maybe I learn something from the TV, but usually journalists come here to get their news. They go here to learn about floods from us. So, actually we are the source of information. Since we already know about this information we cannot learn from the newspapers.

A significant other part of the respondents claimed no external information is provided to them. According to them, all information they possess is learnt by experience, thinking of themselves and by neighbours, friends and family. Since the bulk of this information is only useful for short term prevention these people mostly use their knowledge to perform coping strategies. In many cases these strategies implies securing belongings by storing them in a higher place. For people living in

heightened houses this implies they spread information and stay in their houses during a flood. Only knowledge about heightening their house seems to go further than short-term adaptation strategies. Nevertheless heightening a house is not a lasting solution as well. By heightening a house people improve their living conditions for a several years.

6.2. Institutions

As mentioned before institutions in Kemijen should not be seen as the government only. Contrary local practices might be even more important in neighbourhoods like Kemijen. In this section different local practices, which can also be seen as institutions, will be examined.

6.2.1. Gotong royong

Probably the most important institution for people living in Kemijen is *Gotong royong*, also known as mutual and reciprocal assistance. As mentioned before *Gotong royong* stands for mutual and reciprocal assistance. Among the respondents especially the most vulnerable appreciate this practice very much. Since the vulnerable need other people in cases of for example floods or diseases they are willing to invest in relations within their communities. *Gotong royong* in this sense can be seen as a strategy used by the vulnerable to improve their resilience to shocks. Since the vulnerable participate in this institution they may expect something back. Practices of mutual and reciprocal assistance seem to be performed mostly in neighbourhoods and families. For several vulnerable households *Gotong royong* can affect their livelihoods in a positive way. Mr Sartono for example could move in with his family when he couldn't stay in his own house anymore.

Nevertheless most of the respondents initially didn't see a relation between *Gotong royong* and flooding. When asking for examples of *Gotong royong* general terms like 'helping each other' were appointed regularly. Besides these more general descriptions some practices were appointed. In cases of marriages, funerals and diseases *Gotong royong* is very important according to several respondents. Even though these respondents do not make a direct link between for example diseases and floods it is plausible there is a certain link. Polluted water spread by floods can spread diseases among the inhabitants of Kemijen. Probably because *Gotong royong* is embedded in the local culture people cannot really appoint what this 'institution' means in practice.

As also described in the former section, an important part of the knowledge and information gained by the respondents is obtained through contact with people in the neighbourhood. By informing neighbours a kind of mutual and reciprocal assistance is carried out. Probably the conflicting answers given by some respondents about working together and *Gotong royong* refers to the way this institution is imbedded in the local culture. When asking respondent about working together in relation to floods most of the respondents did not confirm, while after asking about *Gotong royong* several respondent came up with practices of mutual and reciprocal assistance within the flood-context.

6.2.2. (Forum) RT & PKK

Especially for men (*forum*) RT and PKK are very important. Within gatherings organised by these institutions men are informed and have their say about local issues. By asking respondents about water issues discussed in these gatherings some of the male respondents claim these meetings are only for local issues. Apparently these respondents don't consider the water problems as being local issues. According to them these 'formal' institutions cannot be seen as communicators of knowledge and information about flooding. Contrary some men claim the RT and PKK are definitely used to

spread information on how to deal with water problems. According to them also information about funds for heightening the roads is provided through the formal meetings in the neighbourhood. Ideally women living in Kemijen are informed thereafter. An example of a woman who is probably indirectly informed is a woman who can be considered as vulnerable of 51 years old.

Through the RT meetings they taught me I need other people, so it is important to have good relations with people living around you. They also taught me throwing garbage in the river can spread diseases. Because of this I know how to help protecting the neighbourhood against the water problems.

According to the quote above local gatherings are useful to help people to reduce their vulnerable positions. Since this woman obtained more knowledge about the spread of diseases she is able to improve her position. Nevertheless knowledge about recycling should be known and applied by a significant part of the local community to reduce the social vulnerability to be effective. If this is the case, the vulnerability to diseases of a significant part of inhabitants in Kemijen can be reduced.

According to Hadipuro (personal communication) the vulnerability of female headed households is reinforced by the fact they cannot participate in the formal meetings. Since several female respondents in Kemijen confirm this, it is very likely female headed households are more vulnerable. The collective vulnerability might also be affected negatively by the lack of entitlement of female headed households. According to Kelly and Adger (1999) increasing inequality can affect the collective vulnerability negatively. In the case of Kemijen this might happen in the recycling of garbage. Since female headed households are not taught about the negative effects of throwing garbage in the river, they can influence the health of their community by still throwing garbage in the river. In the end local formal institutions can help people to improve their vulnerable positions, but on the other hand they can also increase the inequality which might lead to a higher collective vulnerability.

6.2.3. Ronda

As mentioned before, *Ronda* is originally meant for watching crime during the nights. The perceived importance and purpose of *Ronda* seems to be differentiated. In some neighbourhoods *Ronda* doesn't exist anymore. According to some women interviewed this is because men in their *RT* are too lazy to do *Ronda*. Probably because men in this *RT*'s perceive *Ronda* as being useless they don't show up when they should do *Ronda*. On the opposite *Ronda* is implemented actively in other neighbourhoods. Remarkably in neighbourhoods where *Ronda* is still active respondents have a broader view on the use of *Ronda*. Besides using *Ronda* to prevent crimes, *Ronda* in these neighbourhoods is also used as a water watch.

Men from this neighbourhood and I keep watching the water. When the water is getting higher we work together to warn people from this neighbourhood. We warn everyone from the neighbourhood from person to person. Sometimes we use the sound system from the Musk to warn people.

Even though using *Ronda* to warn people is just meant for the short-term, warning people during the nights for a flood can help people to perform their coping strategies on time. In this sense *Ronda* in some neighbourhoods can be seen as an important institution enabling people to carry out their strategies. The absence of *Ronda* used to help people from the neighbourhood to prevent from flooding is appointed by the wife of one of the *RT* leaders.

Ronda doesn't work here. I am really sad about that. When a flood is coming during the night, people in this area don't know about that. My husband asked people from this RT to discuss Ronda, but many people did not show up.

The quote above displays *Ronda* can be an important communicator of information in order to help people from a certain neighbourhood to prevent themselves from floods. During nights people living in an area where *Ronda* is inactive are likely to be disabled to perform their coping or adaption strategies. Even though *Ronda* is traditionally meant to prevent crime, *Ronda* in some RT's can be seen as an important institution to enable people to perform their prevention strategies. Most likely *Ronda* is only useful for people to perform coping strategies. After a warning only short-term measures can be carried out.

6.2.4. Dasa wisma & Posyandu

Two other important institutions in Kemijen are *Dasa wisma* and *Posyandu*. As mentioned in the glossary *Posyandu* is meant to distribute medicines amongst inhabitants of Kemijen and *Dasa wisma* can be seen as a women organisation. Both of these practices are carried out by women. Most of the male and female respondents elaborated on the practical value of these practices. According to some of the respondents *Dasa wisma* and *Posyandu* have an important role during and after floods. A public kitchen for example is carried out during floods through *Dasa wisma* and medicines and medical assistance needed to recover from flood related diseases is provided through *Posyandu*.

Even though most of the female respondents focussed on the practical values of *Dasa wisma* and *Posyandu*, These practices also seem to have other purposes regarding flooding. An example is education about hygiene. Through *Dasa wisma* some of the female inhabitants claimed to learn about cleaning after a flood and not to throw garbage in the river. Through *Posyandu* some of the respondents claimed also to learn about hygiene in order to prevent against diseases. Since *Posyandu* is more practice-oriented, education is mainly given through *Dasa wisma*.

6.2.5. Polder board

As mentioned in chapter 4, one of the institutions in Kemijen is the polder board. Since some of the respondents came up with this polder board in relation to the water problems the board is likely to have a role in water issues according to Kemijen's inhabitants.

One of the themes people in Kemijen are taught about is recycling the garbage. When talking about water issues, a significant part of the respondents came up with the 'bad habit'. In Kemijen it seems to be commonly accepted that throwing garbage in the ponds or in the river can be seen as a 'bad habit' (Iswari, personal communication). The awareness of the bad consequences of throwing garbage into the water seems to be very high. Even some of the 'more vulnerable' respondents came up with this 'bad habit'. Probably the awareness of local inhabitants has grown because of education provided by the polder board. By setting up a cleaning competition for example people are taught about the consequences of a polluted river and pond. Even though the awareness seems to be high, still garbage can be found in the river and in the ponds (figure X, page). Since this is not a longitudinal research claims about an increase or decrease of the amount of garbage cannot be made.

Remarkably all respondent who came up with the polder board live in heightened houses. These respondents can be identified as being relatively invulnerable. Probably the activities organised to educate people and raise the local awareness are mainly visited by the more wealthy inhabitants of Kemijen. However the most vulnerable households also seem to be entitled, these households

probably don't go to activities organised by the polder board. When looking at the pictures (figure 19 and figure 18, page 34) of the role play and cleaning competition, the most vulnerable inhabitants of Kemijen don't seem to participate. According to Hadipuro (personal communication) the most vulnerable sometimes don't participate in local meetings because they for example cannot dress like other people attending these meetings. Probably certain local norms disable the most vulnerable to attend activities organised by the polder board.



Figure 19: Pump station, polluted river

Usually the poorest housewives do not want to go to local meetings. The way people dress is an important reason. Usually when the housewives attend this kind of meetings, they wear the best dress they have. The poor feel uneasy since they cannot afford to buy an expensive beautiful dress. That is why the social safety-nets cannot reach the poor; it is allocated through such kind of meetings.

6.3. Personal vulnerability management

Since inhabitants according to the vulnerability framework are seen as strategic managers of their assets attention in this section will be paid to these assets and how they are managed. The respondents' abilities to cope with, recover from and adapt to the floods will be appointed. Even though several strategies used and assets owned by these vulnerable managed are appointed already, individual descriptions provide some useful insight in the personal vulnerability management and social differentiation of social vulnerability.

6.4.1. Mrs. Septi

As mentioned in chapter 5.1 Mrs Septi is one of the inhabitants of Kemijen who is continuously confronted with flooding. Within her house she is always having a layer of water. Several assets owned by Mrs Septi are obviously damaged by the fact she continuously has to cope with water in her house. For example her health is influenced by the water in her house. Besides the poor conditions in her house, Mrs Septi's vulnerability is increased because she is part of one of the female-headed households in Kemijen. Since Mrs Septi is a widow she needs to maintain her

household by herself. By making snacks instead of her previous job her loan increased. Nevertheless the financial situation of Mrs Septi got worse since her husband died. Mrs Septi claims she cannot loan money anymore because she cannot pay it back. The limited financial abilities are also emerging from her abilities to visit her sister. Even though her sister is living in Semarang as well she only goes there once a year. According to Mrs Septi her sister is living very far away (1 hour by public transport). This perception of distance might indicate a high degree of vulnerability. Since Mrs Septi doesn't have many abilities to move a one-hour-travel is perceived as 'very far away'.

Even though the financial situation of Mrs Septi is tight, being a member of the *PKK* is very important to her. By paying 6000 rupiahs a month, which is a significant price for her, she prioritises to be a member of the local community. Prioritising to be a member of the local community can be seen as a strategy to manage her vulnerable position. By investing in her neighbours she can count on her neighbours when she is in need of help. For example a location to stay is offered to her, probably because she participates in the local community. By making use of practices like *Gorong royong* Mrs Septi reinforces her position. On the other hand Mrs Septi couldn't say anything about participating in the formal *RT* meetings. According to Hadipuro (personal communication) not participating in the formal *RT* meetings could reinforce the vulnerable positions of female headed households. Probably Mrs Septi is negatively influenced by not participating in formal *RT* meetings as well. The fact she doesn't come up with information and knowledge about help from the government and knowledge about the polder her vulnerable position might be reinforced because she is the manager of a female headed household.

6.4.2. Mr. Sartono

Mr Sartono's position is strongly influenced by the fact he has to deal with a disease. Several assets managed by Mr Sartono are influenced because of this. First of all the health of Mr Sartono can be seen as one of his assets which is negatively influenced because of his disease. Secondly Mr Sartono is not able to work as a construction worker anymore. In the theoretical framework attention is paid to the important role of labour: 'labour is commonly defined as the most important asset for poor people.' Since Mr Sartono is jobless a significant part of the assets owned by Mr Sartono are influenced.

An important asset influenced because of his unemployment is the economic position of Mr Sartono. Since he is not able anymore to make money for his household, Mr Sartono is not able to stay in his original house. He did not have the means to heighten his house or to build another house elsewhere, which made Mr Sartono become very dependent on other people living in his community. Probably, Mr Sartono was not able to make a living anymore without the incomes from his work as construction worker as well.

Since Mr Sartono's economic assets are seriously damaged by his disease social assets are very important to him. The social assets owned by Mr Sartono seem to be pretty strong. Especially family ties helped Mr Sartono to manage his vulnerable position. My moving in with his family he reduced his vulnerability to flooding. Besides that his family and the local community ensures Mr Sartono can 'survive'. Local practices like *Gotong royong* and *Posyandu* for example guarantee Mr Sartono can go to hospital and get medicines when needed. Besides the help offered by the community, Mr Sartono still has a certain role in the community. Since he used to be the leader of the *RT* he is living in he is

living in people come to him to ask for advice. Probably people also come to Mr Sartono, because he is having relatively much knowledge about flooding and land subsidence.

The knowledge and information owned by Mr Sartono can be seen as an asset as well. Even though Mr Sartono is having considerable more knowledge than a significant part of other people living in Kemijen he does not seem to take advantage out of this. Probably because of his relatively weak economic situation Mr Sartono is not able to use his knowledge to improve his vulnerable position.

6.4.3. Mrs. Sutarni

In comparison with the other respondents elaborated in this section, Mrs Sutarni is one inhabitants of Kemijen with relatively much assets owned. Together with her family she lives in a heightened house. By heightening her house Mrs Sutarni used an adaptation strategy to respond to floods. Probably because she heightened her house Mrs Sutarni thinks floods are less worse than in the 1970's. Since Mrs Sutarni lives in a heightened house she feels empowered to invest time in people around her instead of investing in short-term coping strategies. Besides helping people from her neighbourhood Mrs Sutarni thinks about the longer term. In order to be able to have a house free from flooding in the future as well, Mrs Sutarni saves money to heighten her house in the future again. Saving money in order to secure her livelihood in the future can be seen as an adaptation strategy. Besides heightening her house, Mrs Sutarni claims not to take any other measures against flooding. Even though Mrs Sutarni house doesn't get flooded it is very likely that her daily life is still influenced by water problems Kemijen is coping with. For example during floods displacements of Mrs Sutarni are influenced. Probably Mrs Sutarni doesn't perceive herself as being vulnerable in comparison with other people from her neighbourhood. Nevertheless several assets are threatened or damaged by floods. Mrs Sutarni doesn't seem to participate in mitigation strategies. She only seems to respond to effects of flooding in her neighbourhood.

Even though Mrs Sutarni's position seems to be relatively good, she doesn't know a lot about the reasons of water problems in her area. By asking Mrs Sutarni about the causes of floods in her area she only comes up with the height of the area she is living in and tidal floods. Probably the reason for Mrs Sutarni's limited knowledge is because she is mainly focused on her own community and doesn't obtain much knowledge out of Kemijen. Even though Mrs Sutarni doesn't seem to have many acquaintances can pass on information and knowledge it doesn't seem to affect her vulnerable position negatively. The most important source of information for Mrs Sutarni is her son. Since he is working in the harbour he can pass on flood predictions. According to Mrs Sutarni she doesn't really need predictions because she lives in a heightened house. By passing on this information Mrs Sutarni can be seen as an information source for the more vulnerable people living in her *RT*.

Even though Mrs Sutarni claims to see a link between local practices like *Gotong royong*, *Posyandu*, *Dasa wisma* and dealing with the water problems, she doesn't claim to have advantages in the flooding context. Probably since Mrs Sutarni and people in the neighbourhood perceive her as not being vulnerable to flooding Mrs Sutarni doesn't need to use advantages regarding the water problems. Yet local practices and institutions might be more important than perceived by Mrs Sutarni herself. Since the road within her *RT* is getting heightened through local institutions the social vulnerability of Mrs Sutarni is influences positively. Furthermore her position in local organisations might make her reputable within her neighbourhoods which can contribute to assistance when needed. Even though Mrs Sutarni implicitly claims to be invulnerable she cannot free herself

completely from flooding as long as she stays in her neighbourhood. According to Mrs Sutarni, it's worth it.

6.4.4. Mrs. Sugiyasi

In contrast to Mrs Sutarni, Mrs Sugiyasi perceives herself as being vulnerable to floods in her area. Since Mrs Sugiyasi is living in a low-lying house close to a polluted pond (figure X) she can be perceived as very vulnerable to the physical effects of flooding. Mrs Sugiyasi seems not to be fully aware of the consequences the area she is living in might have for her health. When talking about health consequences she only comes up with her feet which are hurting because of sand between her nails. Probably because Mrs Sugiyasi lives in Kemijen for just two years she didn't experience worse physical discomfort.

The access to knowledge and information of Mrs Sugiyasi seems to be very limited. She only went to elementary school and because Mrs Sugiyasi is always staying with her children she doesn't seem to be highly involved in local practices. Probably for this reason Mrs Sugiyasi made up an 'impossible' theory about sea level rise. According to her the sea is getting higher because of the growing amount of boats in the ocean. Another example of the limited (access to) information Mrs Sugiyasi owns emerges from her claim in which she states to don't know where the funds needed to heighten the roads are coming from.

When asking Mrs Sugiyasi about measures she takes to prevent or to secure her household from flooding, she claims to be forceless. In first instance she comes up with nothing, but after she is coming up with some coping strategies. One of these strategies is to store her belongings at a higher place when the water level in the area is getting higher. Also 'just running away' can be interpreted as a coping strategy. By fleeing for a flood she takes short-term measures in order to secure her household. Another strategy Mrs Sugiyasi is coming up with is to migrate to an area free from flooding. By migrating to another area Mrs Sugiyasi enables herself to apply an adaptation strategy. According to Mrs Sugiyasi this option is blocked by her husband because of his relations in the neighbourhood. It may well be that lack of financial assets also disables Mrs Sugiyasi to move elsewhere. Since the knowledge, information and abilities owned by Mrs Sugiyasi seems to be very limited it is very unlikely Mrs Sugiyasi applies or knows about mitigation strategies.

Since the financial and educational assets owned by Mrs Sugiyasi are very limited it is very likely she invests in social assets in order to secure her livelihood. Mrs Sugiyasi claims her neighbours are very important to her. 'They help me because we have a good relation'. By investing in relations with her neighbours Mrs Sugiyasi improves her vulnerable position. In times of trouble she knows she can ask her neighbours for assistance. Even though Mrs Sugiyasi doesn't seem to be deeply involved in local practices, these institutions are helpful to her. An example she comes up with is the free supply of medicines done by *Posyandu*, especially after a flood. Remarkably Mrs Sugiyasi doesn't give any example about information provided through local practices. Her limited involvement in local practices seems to constrain her access to knowledge and information.

7. Conclusions and recommendations

According to Hadipuro (personal communication) resilience and sensitivity of people living in Kemijen is socially differentiated. 'You have to observe and ask questions to the inhabitants of Kemijen themselves'. Since this research aims to place the local inhabitant at the centre stage this chapter will give some concluding remarks about the link between access to knowledge and information, and the way people in Kemijen manage their vulnerable positions. Thereafter recommendations and subsequent critical notes will be provided.

7.1. Conclusions

Within this section the research questions as stated in chapter 1.5 will be addressed. Below the main question is outlined again.

How do local inhabitants in Kemijen use their knowledge and access to information to manage their vulnerable positions?

In order to answer this question the sub-questions will be covered in the following sub-sections. Since the aim of this research also is to improve the understanding of the concept of social vulnerability and its link with access to knowledge and information, concluding remarks about this link will be given within several sub-questions. Finally the information obtained through the sub-questions will be used to answer the main questions in the last sub-section.

7.1.1. Local knowledge

As argued in the conceptual framework (chapter 2.2) knowledge or information owned by inhabitants of Kemijen can be divided into two categories. First of all local inhabitants have certain knowledge or information about the causes of flooding. Remarkably none of the respondents argued land subsidence in Kemijen is caused by the extensive withdrawal of groundwater. Most answers given by respondents from Kemijen can be typified as less profound. Probably this limited knowledge is caused by the way people in Kemijen obtain their information on which will be elaborated in the next sub-section.

A second category of knowledge is knowledge about strategies cope with, adapt to or to mitigate the water problems in their area. Since it is likely a significant part of Kemijen doesn't know about the underlying cause of the water problems in their area it is logical no mitigation strategies are found within this research. Even though this link might look irrelevant the link between the knowledge and information owned by people can be of great importance to reduce problems in vulnerable areas. As stated by Füssel and Klein (2006) information is needed to enable people to take effective measures. Easily stated, it is unrealistic to expect people to implement the best strategies towards stress placed on their households if they don't know where this stress comes from. Since the local knowledge can be seen as a result of the access and entitlement of people this sub-section is having close links with the following sub-section.

7.1.2. Obtaining knowledge and information

In order to be able to answer how people in Kemijen use their access to knowledge and information to manage their positions, information about their access is essential. By looking to how information and knowledge is obtained more information about the accessibility of knowledge and information is obtained.

Personal observations can be seen as an important information source used by people living in Kemijen. Mostly the information obtained through personal observations is used to carry out coping strategies. Even though these strategies don't seem to be long-term solutions, these coping strategies are very valuable, especially for the most vulnerable. By experience through previous observations people can 'predict' when new stresses are placed on their livelihoods. Even though these short-term strategies are very valuable for the vulnerable, short-term strategies may have negative consequences in the long-term. By living from one to the other stress people don't invest in more structural measures anymore. Focusing on short-term coping strategies might lead to a higher degree of inequality in neighbourhoods like Kemijen. Since the less vulnerable also use their access to knowledge to invest in the longer term through for example education, their living conditions improve in contrast to the livelihoods of the most vulnerable.

Interaction with family or people from the neighbourhood is another important source of information. By communicating with other people about coping and adaptation strategies, several strategies used in Kemijen are commonly used. Examples of these strategies are heightening the houses, store equipment at higher places during the floods and investing in education. Besides these strategies relations within communities are also used to warn each other in cases of emergency. Through local interactions people are informed about an upcoming flood. A person with a high degree of access to information can reduce the vulnerability of the community this person is living in. Subsequently a community without people having a high degree of access to information can reinforce the collective social vulnerability. Besides the lack of knowledge about possible future stresses also information about funds might pass a vulnerable community.

Next to personal observations and information obtained through interaction some other sources of information are important for inhabitants of Kemijen and probably also for people from other vulnerable areas. One of them is the role of education. Since education is commonly done through institutions, this will be elaborated in the next sub-section. Besides this education, information is also obtained through media and contact with experts on what kind of problems the area is coping with. The uses of this kind of resources seem to be very limited. Even though several inhabitants have access to the internet and other media, these sources doesn't seem to be used to obtain knowledge and information. Probably a lack of education on how to use access to this kind of resources restricts people to use this knowledge. Since this knowledge might be useful to obtain knowledge about floods and concerning strategies, a lack of knowledge about how to use a certain channel of information might disable an individual to reduce his or hers vulnerable position.

7.1.3. Institutions

Institutions appear to play a dual role in the social vulnerability of individuals and communities in Kemijen. On the one hand institutions seem to provide meaningful education and information used by inhabitants to reduce their vulnerability. On the other hand inequality seems to be reinforced, since institutions don't always seem to reach the most vulnerable. In this sub-section concluding remarks of this dual role will be provided.

Firstly institutions seem to play an important role in the vulnerability reduction. Information and education is often provided through local institutions. Local institutions often can be seen as an effective mean to raise the awareness of people within the local community. By participating in local institutions people are taught what problems the area is coping with. By spreading meaningful

information and education local inhabitants are enabled to improve their vulnerable position. Probably also the collective vulnerability can be reduced through local practices. Secondly local practices can play an important role in collective coping strategies. By using local institutions like *Ronda* to warn people for an upcoming flood the collective social vulnerability can be reduced. Also collective practices to help the neighbourhood to recover after a flood reduce the social vulnerability. Surprisingly no data is found about a probable link between institutions and mitigation strategies. Even local institutions don't seem to be focused on the major cause of the water problems in Kemijen.

On the negative side through institutions individual and collective vulnerability seems to be reduced. The most vulnerable households don't seem to participate in the institutions which are used to educate and inform people. The lack of knowledge may lead to ineffective measures taken by the most vulnerable to prevent themselves against flooding. This growing inequality also affects the collective vulnerability. Since the most vulnerable for example don't know the basics of hygiene a complete community can be affected. The social vulnerability of different households in Kemijen can be reduced by the (perceived) entitlement of local inhabitants. First female-headed households do not participate in local practices in which essential information about the water problems is provided. Secondly the most vulnerable often don't seem to feel entitled to participate in meetings in which they can be informed and educated. A third probable vulnerability reinforcing practice might be found in the focus of the most vulnerable as stated in sub-section 7.1.2. Since the most vulnerable are mainly focused on short-term coping strategies, they might not see the utility of participating in local institutions.

7.1.4. Using access to manage vulnerable position

In conclusion, the way people use their knowledge and access to information is socially differentiated. Nevertheless similarities amongst the respondents can be found in the way access to knowledge and information is used. Information and knowledge is used to improve social vulnerability. Having said that access to information for an individual does not necessarily lead to a better management of the vulnerability; meaningful knowledge often provided through education is essential to be able to use this knowledge. Mostly also other resources are needed for individuals in combination with their knowledge and information in order to be able to manage their vulnerable positions. Access to knowledge only cannot reduce ones social vulnerability.

A significant part of the information obtained by the local inhabitants is meant for the short term. Especially the most vulnerable tend to focus on coping strategies only. Since they only tend to use knowledge and information provided through own observations and people living close to them, the information owned and knowledge seems to be limited. This lack of access is probably a result of the (perceived) entitlement of the vulnerable. Even though the less vulnerable people tend to take more durable measures in order to prevent their households, the durability of the measures taken by these people is limited as well. Probably the only way for households to completely free themselves from flooding is to move out of Kemijen.

An important note on this concluding remarks remains. Since in Kemijen distinctions between the most vulnerable and the in/less vulnerable are made too, this doesn't mean a significant part of the local inhabitants cannot absolutely be placed in one of these categories. Since vulnerability is socially differentiated and vulnerability is not equal to being poor absolute distinctions cannot be made.

7.2. Reflection and recommendations

In this sub-section a critical view on this research will be given. Since some parts of this reflection might be useful for future studies the reflection will be done first. After that some recommendations for future research will be provided.

Since this research aims to place the inhabitant of Kemijen at the centre stage of the research its external validity is limited. Overall statements about social vulnerability, also social vulnerability in Kemijen should be made with necessary caution. Nevertheless this research gives insight in strategies and practices used to reduce the social vulnerability. Another point of review can be found in the role of institutions. Since the role of institutions is only described from the perspective of local inhabitants and some experts probably not a complete portrait of these institutions is provided.

Following from these reflections several recommendations for future studies can be made. Firstly a more quantitative study can examine certain possibilities stated in this research. Especially the role institutions play in reducing or reinforcing social vulnerability might be interesting to do further research about. Secondly a study focused about the role of institutions appointed above might be interesting. The (possible) role of institutions in mitigation strategies might be interesting to explore.

Independently from the recommendations stemming from the reflection some other future studies might be interesting as well. A practical oriented study on how to reach the most vulnerable might be interesting for several institutions to be able to further reduce the social vulnerability and inequality. Secondly a longitudinal research might be interesting to observe changes in vulnerability. Subsequent causes within a longitudinal research might be recognised more easily.

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Appendices

Appendix I: interview guide

In general

Respondent's name:

How many people are living in your house?

What is your relationship with them?

What job do you have?

Water problems

Now we want to talk to you about the water problems in this area:

Please describe what kind of water problems this area is coping with?

Do you remember the time before the increase of the water problems? What are the differences between then and now?

What do you think is the major cause of the water problems?

- How did you acquire that knowledge?

When was the last time you experienced a flooding?

- Please describe what happened and how you experienced it?
- Did you feel safe during the flooding?

Dealing with the problems

What do you do to protect your home, household and belongings before, during and after flooding?

- In what way does this help to protect your home, household and belongings?
- Do you think you have enough abilities to protect yourself?
- Did you work together with other people from your neighbourhood in this?

What are you doing now to prepare for the next flooding?

- Do you think you have enough information on how to prepare?

Are you participating in any formal organizations that are dealing with the water problems?

Relationships

Now we want to talk about relationships, with this we mean ties or bonds between you and another person or group.

Could you please tell us something about ties that are important for you?

- Family, friends, neighbours, colleagues
- Why do you have a relationship with them? Do you have common purposes?
- Are any of these ties with people with a different religion or ethnicity?
- Where do these people live in general?
- Did any of these people live in this neighbourhood before?

Working together

What do Gotong Royong, Ronda, Dasa Wisma and Posyandu mean to you?

- Do you have any examples of these practices in your neighbourhood?
- What are the differences between these practices before and after the increase of the water problems?
- Do you think that these practices contribute to the protection of your neighbourhood against the water problems?

When a household gets in trouble because of the water problems, do other members of the neighbourhood help them?

- Can you give any examples?
- Does this happen on a voluntary basis?

Moving

Now we want to talk about reasons to move from or to stay in the area.

What are the reasons for you to stay in here?

- Do your relationships have any influence on you staying here?

If you would move out of this neighbourhood, where would you go and why?

Appendix II: General information of respondents from Kemijen

Resp. nr.	Gender/age	Household size	Relationship with household members	Employment	Living condition
#1	Female, 52 years	2	Living together with her daughter	Owner of creative house. Making craft of plastic (rubbish)	House on street level, floor of stone
#2	Female, 46 years	4	Living together with 2 children and husband	Makes snacks and sells them	Living permanently with water in her house, floor of sand
#3	Male, 67 years	6	Living together with his wife, 3 children and 1 grandchild	Works for himself, repairs and sells diesel-machines	High house with own pump, floor of stone
#4	Female, 70 years	5	Living with husband, her son and his wife, and 1 grandchild	Doing household, head of <i>Posyandu</i>	Heightened house, floor of stone
#5	Male, 37 years	4	Living with his wife and 2 children	Freelancer. Finishing furniture	Heightened house, floor of stone
#6	Male, 55 years	3	Living with his wife and 1 child	Collecting garbage	Low house. Very vulnerable to flooding, floor of sand
#7	Female, 28 years	4	Living together with husband and 2 children	Doing household	House on street level, floor of sand
#8	Male, 65 years	6	Living with 2 families, Father, mother, children, one single child, one married child with her husband, one grandchild	Jobless because he is sick, used to be a construction worker	House on street level, floor of stone
#9	Female, 51 years	9	2 families: she with her husband, 6 children and 1 grandchild	Doing household, used to work at a herbs company	House on street level, floor of stone
#10	Female, 21 years	4	Lives together with parents and 1 sister	Student	Heightened house, floor of stone
#11	Female, 43 years	4	Living together with husband and 2 children	Doing household	House on street level, Next to the river, Floor of stone, living permanently with water in her house
#12	Male, 27 years	6	Living with his parents and his brother and two nieces	Freelance construction worker	House on street level, floor of sand
#13	Male, 32 years	4	Living together with his wife and 2 children	Freelance ship mechanic	Heightened house, floor of stone