Participation, the key to less vulnerability and more resilience?

A research about the shift from a modernist- to a more postmodernist planning approach with the goal of reaching less vulnerability and more resilience against natural hazards in the Code river area in Yogyakarta, Indonesia.
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Acknowledgements

In front of you lies my bachelor thesis which focusses on the usage of different approaches in urban planning in case of the occurrence of a natural hazard, applied on the case of the Code River Area in Yogyakarta, Indonesia. The research for this bachelor thesis is done in Yogyakarta, and more specifically in three different parts of the Code River Area. I wrote this bachelor thesis in order to proceed with my bachelor-program Geography, urban planning, and environmental studies.

As mentioned earlier, this research has been carried out in in Yogyakarta as a result of a long partnership between the Radboud University Nijmegen and the Gadjad Mada University in Yogyakarta. I derived inspiration for the idea after reading some geography- and urban planning related articles about Yogyakarta. A particular article focused on the problems in the Code River Area. Building on this, with strong interest in urban planning, I wanted to combine this with the geography related lahars. I came up with the idea to do a research about how different planning approaches can have a big influence on how and whether the problem is handled in a proper way. Together with my supervisor the subject was perfected.

To be able to do a research project in a foreign country, you need the possibility to do it. This is why I am very thankful to everyone who made it possible to do my research project for my bachelor thesis in Indonesia. Amongst them is my Dutch supervisor Lothar Smith, who I want to thank for helping me as a supervisor. I also want to thanks Martin van der Velde for helping us with our research proposal. I also want to thank my supervisor Dr. Estuning Tyas Wulan Mei and the other supervisors of University Gadjah Mada for supporting us in this project. Moreover, I want to thank Ratih Paniti Sari, Faricha Kurniadhini, and Tri for helping me at the practical side of the research. Tri is a resident of the Code River Area and due to his bond with the community, it was quite easy to find respondents for the interviews. Ratih Paniti Sari and Faricha Kurniadhini helped us with the interviews and solved the problem of the language barrier by translating important parts during the interview and making a summary of the interviews in English afterwards.

I wish you an enjoyable read.

Ruud de Louw

Nijmegen, 6th of July 2017
1.0 Introducing the research

*In this chapter the subject of the research is explained, which is followed by an explanation about the relevance for society and science. After the explanation of the relevance, the goal of this research is elaborated on and at last the research model is displayed and explained.*

Where is my research focused?
Indonesia is a country that is known for its large amount of historically active volcanoes, 76 to be precise. One of these volcanoes is the Merapi near Yogyakarta. The Merapi recently erupted in 2015 causing several deaths and destroyed many livelihoods. It is estimated that the Merapi volcano will erupt every one to five years in the near future (Seach, n.d.). Despite these warnings that the Merapi is highly explosive at the moment, people keep living near the volcano and in zones that are dangerous, due to results of eruptions. Eruptions cause lahars, pyroclastic flows, outcome of (dangerous) gases and lava flows. The eruptions can cause serious damage to livelihoods, is dangerous for people and can even cause dead. The most dominant destructive outcomes in the case of the Merapi are lahars and pyroclastic flows. Lahars are extremely destructive due to the fact that it is led through the city Yogyakarta. This lahar that is directed through the city, is caused by the fact that the Code River streams through the city and has its founding at the slopes of the Merapi. The lahar that comes from the mountain then easily flows into the river bed that causes extreme water heights and flooding’s downstream. My research area will be around the Code river in Yogyakarta, because that is the area that suffers most from results of eruptions of the Merapi in the form of Lahars. The degree of suffering of this neighbourhood is not only caused by their location, but also by other factors like their economic problems and low level of education. These factors combined with others make the Code river area more vulnerable and less resilient against the occurrence of a lahar. An important factor for the amount of destruction that can be caused by a natural disaster, are the rapidly growing cities. This causes a higher density of people in the city, which makes the population that can be affected by a disaster bigger and makes this issue even more urgent (Rachmawati & Kingsma, 2013). Mitigation of the lahars can be organised by urban planning. Urban planning is the profession in which planners plan the land use in cities. Urban planning decides in which way spaces should be used. Urban and regional planners make plans and programs for land use in their own jurisdictional area. “they keep their communities vibrant and healthy by keeping up with population growth, revitalizing, replacing, or repurposing aging infrastructure” (environmentalscience, n.d.).

The urban planning system in Yogyakarta tries to make Yogyakarta less vulnerable and more resilient against the occurrence of a lahar. They use a modernist approach of urban planning, also known as top-down planning. Even though the planners try to find a professional solution for the problems caused by the Merapi, there is still a lot of nuisance of eruptions.

Another more recent approach to urban planning is the postmodernist approach. This is an approach with more community-led planning, which can have some advantages on the modernist approach When scientists and citizens work together the understanding of each other gets better which can cause better solutions that fit better in the society. Also, it creates a higher perception of risk amongst the citizens, because they get more knowledge about the dangers of the eruptions. As a result of that the resilience of communities can rise and the vulnerability of communities could sink. But which approach of planning, the modernist- or the postmodernist approach, is better in this situation?

So the objective of this research is to expose the vulnerability and the resilience of the residents of the Code river area and link these to the modernist- and postmodernist planning approach to see which approach is best. Since the government currently uses the modernist planning approach we
will look at the results of a shift to a more postmodernist planning approach, this has led to the following research question:

*How can a shift in the modernist planning approach towards a more Postmodernist planning help reduce the vulnerability, and increase the resilience, of communities in the Code river area?*

### 1.1 Societal and scientific relevance?

**Societal relevance**

So what does this research mean for the case of the Code River Area? The Code River Area is an Area that is located in Yogyakarta, a city in central Java, Indonesia. Yogyakarta is located near the highly active Merapi volcano, which is of great concern for the city when the volcano erupts.

The Code River Area is located near the city centre on the river banks of the Code River. The Code River Area is known for its marginalized character. This marginalized character can be seen in the low level of education and the low level of income. The Code River Area is not only a so called ‘black area’ in the economic sphere, which means that it is economically low developed, but is also significantly more affected by the occurrence of lahars. The lahars find their way through the city by its river streams, and one of them is the Code River Area. Since the Code River Area is an area with low economic resources and a low level of education, it is hard for the residents to do something about the effects of a lahar. They mostly are not able to move out of the Code River Area and live somewhere else.

The government tries on its behalf to do something about the effects of a lahar, by building barriers and building the Rumah Susun. This is all done from a modernist, top-down planning approach. It will be tested whether this approach is effective or if it shows that the modernist approach of planning is not fully suitable for making the area safer for lahars. The alternative approach that has not yet been used in the Code River Area employs postmodernist planning approach. By using a more postmodernist, more cooperative, approach of planning ideas of residents and experts can be used together in making a plan that comprehends with the residents desires and the decrease of the dangers of a lahar in the Code River Area. The experts can learn from the experiences of the residents and the residents can learn from the knowledge of the experts. In one sentence my research could be used to make the Code River Area safer.

**Scientific relevance**

The research will not only have a practical outcome, but will also contribute to scientific research. In this research modernist and postmodernist planning approaches are tested on a marginalized area that is affected by a natural hazard/disaster. The modernist planning approach is oriented on a top-down basis, whereas the postmodernist approach is more based on a bottom-up basis with participation from the residents. This research could generate knowledge about the two different planning approaches and which one is best to use in particular situations. This can be of help in other areas, that are also struggling with natural hazards/disasters. The research can also contribute to other similar researches about which concepts can be of use in this type of research.

### 1.2 Goal of this research

The goal of this research is to derive new insights in modernist- and postmodernist planning theories that could contribute to these planning theories. By gaining new insights the applicability and relevance of modernist- and postmodernist planning approaches in the situation of a possible occurrence of a natural hazard/disaster. The research will not only provide insights in which kind of planning approach suits best in a particular situation, but also explains why and will even give some recommendations in how this could possibly be filled in. The creation of a better understanding
towards the relevance and applicability of modernist- and postmodernist planning in such a situation can be used in future similar cases.

Explanation of the goal: The goal of the research is contributing to the modernist- and postmodernist theories of planning approaches and contribute to methods that can be of use in reducing the damage suffered from lahars caused by the eruptions of the volcano Merapi near Yogyakarta. The contribution to both, makes the goal useful, both on scientific- and social level. The research is either way an accomplished mission. On the one hand the research can show that modernist planning is better in this kind of situation, or postmodernist planning is better in this kind of situation. This is important to get a better understanding in the use of different planning approaches in different situations, to make the planning system more successful. The contribution to the social account for this research is hard to estimate, because the scientific literature about the subject is limited. The lack of literature and the ongoing discussion of which kind of planning approach is most useful, makes it that the new literature that will be produced by this research has an high level of information. The goal is clear, the modernist approach is already used in practice in Yogyakarta and the postmodernist approach will be tested during the research. This means that the research will be unambiguously. To test the postmodernist planning approach I try to form the interviews in the way that people get familiar with the postmodernist planning approach and after that asking them what they think this planning approach may bring for them. On top of that asking them their solutions to reduce disadvantages of eruptions.

1.3 Research model

![Diagram](image)

*Figure 1, shows the theoretical build-up of the research*
The research model starts with two different theories of approaches of planning that will be elaborated on in this research: The modernist planning approach and the postmodernist planning approach. These planning approaches are different from each other in a couple of things, of which the most important one is that in modernist planning, planning is done by the government and there is no interference of local residents and in postmodernist planning, planning is done by multiple stakeholders including the local residents. Furthermore, the two planning approaches will be discussed and compared to each other (a). The confrontation between these two theories will lead to a research-perspective on the different outcomes on concepts like vulnerability and resilience, that are caused by the two different planning approaches. This research perspective will be linked to the research-object, the particular case for the research (b). The linkage and implementation of research perspective in the research object will lead to results, that will be analysed(c). The outcomes of the earlier mentioned parts of the research can lead to conclusions and recommendations for the future (d).

1.4 Research questions

The following question will be central in this research: How can a shift in the modernist planning approach towards a more Postmodernist planning help reduce the vulnerability, and increase the resilience, of communities in the Code river area?

Sub questions:
- Why is the Code river area vulnerable and how could this be influenced by modernist- and/or postmodernist planning?
- Why is the Code river area not resilient and how could this be influenced by modernist- and/or postmodernist planning?

The sub questions are formed in a way that provides highly in-depth insights, which is useful in order to create qualitative research. The first sub question will provide deeper insights about the concept vulnerability and will thereby elaborate on how modernist- and postmodernist planning could be used to decrease the vulnerability. Sub question two will provide deeper insights in the concept of resilience and will thereby elaborate on how modernist- and postmodernist planning could be used to improve the resilience of the residents of the Code river area. The subquestions will form a guideline, to come to a conclusion and to answer the central research question. These questions, therefore, will not be literally used during the analysis of this research. The reason for this, is to make a more coherent story, which will read more easily and takes you more into the subject.
2.0 Important theories and concepts

This chapter gives an overview of the concepts used in this research and explains them from earlier produced literature. It also provides deeper insight in what the relations between these concepts are.

2.1 Theory’s and concepts used in this research

Planning systems

As mentioned earlier, growth of population and the expansion of settlements in zones around volcanoes, the impact of the eruption of volcanoes are increasing. A phenomenon that can be regulated by urban planning. First, let’s talk about the role of urban planning. Fainstein contributes to theory of what the role of urban planning should be in her book about the Just City. In this book she elaborates on her vision about cities, how cities are dominated by economic growth and the politics of planning. When it comes to urban policies, Fainstein believes that these policies must be devoted to ‘justice for all residents, especially low-income people’ (Fainstein, 2010). In her book ‘Planning Theory and the City’ Fainstein argues, that planning theory should provide answers to the following questions: (1) ‘Under what conditions can conscious human activity produce a better city for all citizens? (2): How do we explain and evaluate the typical outcomes of planning as it has existed so far?’ (Fainstein, 2005, p.5). Out of question one, we can make up, that planning theories should be for all citizens and not just for the rich or the poor. Idem this vision can be seen in other parts of the book. For example, in the book, Fainstein devises justice in three different concepts: equity, democracy and diversity. Fainstein states that important for ‘equity’ is, that planning projects promote equality and try to improve the lives of low-income residents (Fainstein, 2005).

Urban planning in developing countries in the contemporary world is focussed on two urban theories, the Chicago School of Urban sociology and the Los Angeles School of Urban Geography. The Chicago School of Urban sociology and the Los Angeles School of Urban Geography have both modernist views on planning (Rukmana, 2010). The modernist paradigm domain of planning “operates in the public interest and planners seek to identify that interest within community. Planners attempt to present a public image of neutrality and planning policies based on positivist science. The notion of public interest comes from a frame of reference in liberal political theory in which disinterested experts objectively and rationally analyse a problem and arrive at a solution that is in the public interest. It assumes the ability of a certain chosen, well-educated group to stand outside social processes and decide what is best for everyone else” (Sandercock, 1998). Friedmann (1987) contributes to the theory about modernist planning and describes it as followed: “planning is considered as a project of state directed futures. State is seen as reformist tendencies and as being separate from the economy. Planning in the social reform tradition acknowledges that there would be an inherent tendency to resist change that would give rise to conflict. However, modernist believes that these conflict situations are manageable and through rational decision making and that conflict creating situations can be eliminated or at least minimized and better managed”(p.77). Modernist planning also believes that conflict can be avoided through appropriate intervention at the right time. Modernist kind of planning is more top-down, whereas postmodernism is more focussed on community-based planning. Citizens are able to interfere more in the process and dictate the agenda of the local government. Participation is key for this kind of planning and can lead to better public policy. It might be that the residents give more selfish input, but this gives the government more information so they can fulfil the needs of the citizens better (Verba, 1972). For an overview in the form of a scheme, see next page.
Planning approach | Important actors | Pros and cons
---|---|---
**Postmodernist** | Residents & experts | - More appropriate with wishes residents
| Multiple stakeholders/actors | - Harder to control and keep an overview

**Modernist** | Experts/policy-makers | - Better to control and gives a better overview
|  | - Less appropriate with wishes residents

Figure 3, gives an overview in the form of scheme about the modernist- and postmodernist planning approach

In Yogyakarta, as well as in Indonesia, they use the modernist approaches of the Chicago School of Urban Sociology and the Los Angeles School of Urban Geography, by default though (Rukmana, 2010). Which specific policies do they have for the Merapi Volcano? Could this be better regulated by the people themselves. How can a postmodernist view lead to a better solvation of the problems caused by lahars? Can a coalition between residents and experts/scientists lead to less vulnerability and a better resilience?

**Natural hazards**

The eruption of volcanoes is a natural hazard, the term natural hazard implies “the occurrence of a natural condition or phenomenon, which threatens or acts hazardously in a defined space and time”. The concept can also be seen as “the elements in the physical environment harmful to a man” (Alcántara-Ayala, 2002, p. 108). Alexander (1993) explains the term natural hazard as a physical event which makes an impact on human beings and their environment. The Natural hazards are threatening events, that can bring damage to the physical environment, but also/as well to the social space. It is possible that the natural hazard does not only have impact at the time it occurs, but also on a more long-term basis. When the outcomes of a natural hazard have a major impact on society and the physical environment, such as for example infrastructure, the natural hazard becomes a natural disaster (Alcántara-Ayala, 2002). “Hazards can be explained as a sudden change in a long-term behaviour caused by minute changes in the initial condition” (Scheidegger, 1994). When you look at natural hazards in a geomorphic way, hazards can be divided in three kind of processes: Exogenous, endogenous and those that are caused by climate change and/or land use. Volcanism can be seen as an endogenous process. Endogenous means as much as inside the earth, so beneath the soil of the earth (Alcántara-Ayala, 2002).

**Natural hazard vs natural disaster**

There is a difference between natural hazards and natural disasters. When the last one, natural disaster, is the case not only a natural hazard happened, but it also affected essential functions of society in a negative way (Alcántara-Ayala, 2002). Alexander (1993), subscribes natural disaster as: “some rapid, instantaneous or profound impact of the natural environment upon the socio-economic system”. Over the whole world, natural disasters occur, but when you look at the total frequency divided over the world it can be seen that there are occurring more natural disasters in developing countries then in already developed countries. The reason for this is partly, that a big part of
developing countries is located in areas that are highly vulnerable for natural hazards (Alcántara-Ayala, 2002). This is confirmed by the CEPAL (Comisión Económica para América Latina) (1999) that state that “the spatial distribution of natural disasters shows a clear tendency to occur in developing countries”, which takes us to the following concepts.

Spatial- and social justice

The uneven distribution of the burdens of a natural hazard, such as a lahar, can be related to the concepts of Spatial justice and social justice (Fainstein, 2010). Spatial justice makes you “consider the distribution of society’s benefits and burdens at different spatial scales, taking into account both variations in people’s need and in their contribution to the production of wealth and social well-being of a lot of people, nations, and ethnic groups around the world feel marginalized, exploited, and neglected as a result of the quickening pace of change” (Knox & Marston pg. 67). Whereas Social justice has more to do with the uneven distribution of these inequalities between different social groups (Harvey, 2010). Additionally, Harvey (2010) argues about the relevance in planning: “social justice has some relevance for the application of geographical principles to urban and regional planning” (p. 9). Soja (2009), describes spatial justice as followed: “The starting point of spatial justice involves the fair and equitable distribution in space of socially valued resources and the opportunities to use them. Spatial justice is not a substitute or alternative to social, economic, or other forms of justice but rather a way of looking at justice from a critical spatial perspective” (p. 2). Soja (2009) also mentions locational discrimination, which he sees as the situation that occurs because of the “biases imposed on certain populations because of their geographical location”. This is “fundamental to create spatial injustice and the creation of lasting spatial structures of privilege and advantage” (p. 3). Building on this, the three main influencers of this are class, race and gender (Soja, 2009). An area which is affected by spatial injustice can come into downward spiral move, which is known as cumulative causation. Cumulative causation can lead to a positive upward spiral as well as to a negative downward spiral, whereas the positive upward spiral is caused by positive developments in a region that lead to more positive developments. The negative downward spiral is caused by negative developments that lead to more negative developments in the area. Solutions to break through this negative spiral are strongly associated with governmental actions, but can also come from ‘spontaneous’ development projects such as Foreign Direct Investments or efforts from the community itself (Pijpers, 2014).

Coping strategies & vulnerability

Natural hazards and disasters are still hard to control, so the focus lays on coping and predicting these dangerous events. Technological advances in predicting volcanic activity, create a better understanding of the mechanism and to some extent a bettering in coping mechanisms. The downside of this is, that the trend exists, that only the more developed countries can afford this predicting mechanisms. This can be linked to the concept of vulnerability. The concept of vulnerability can be constituted in natural- and human vulnerability. The figure on the next page shows how two systems interact with one another and gives some extra context to the natural hazard and natural disaster dualism.
Figure 2, explains the concept of vulnerability and the relation to natural disasters (Alcántara-Ayala, 2002).

Having established this, according to the figure natural vulnerability is influenced by the atmosphere, lithosphere, and the biosphere (Alcántara-Ayala, 2002). The dependence on those three factors and the uneven devidence of those over the world makes the concept of natural vulnerability related to spatial injustice (Knox & Marston, 2014). Human vulnerability has four factors, which are social, economic, political and cultural. These types of vulnerability are the basis for human vulnerability and out of these four factors, more specific factors of vulnerability can be defined (Alcántara-Ayala, 2002).

Some areas are more vulnerable for natural hazards then other areas and some people are more vulnerable than others, but what is vulnerability? Vulnerability can be caused by different factors, as Alcántara-Ayala (2002) opposes. Alcántara-Ayala (2002) differ vulnerability in eight different forms, that do not exclude each other:

- Materials/economic vulnerability: a lack of access to resources
- Social vulnerability: disintegration of social patterns
- Organizational vulnerability: Lack of strong national and local institutional structures
- Educational vulnerability: Lack of access to information and knowledge
- Attitudinal and motivational vulnerability: lack of public awareness
- Political vulnerability: limited access to political power and representation
- Cultural vulnerability: certain beliefs and customs
- Physical vulnerability: weak building of weak individuals

(Schmidlin et al., 2009).

Social vulnerability is one of the sub-concepts of vulnerability that should be elaborated on, since social class is highly important in this particular case. Social vulnerability is influenced by a variety of factors. Social class is one of the largest contributors to social vulnerability. Social class includes employment (type and stability), income, savings, and education (Burton & Cutter, 2008). Schmidlin et al. (2009) gives the following definition of social vulnerability “social vulnerability to natural hazards is the potential for loss and is complex interaction among risk, mitigation, and the social fabric of a place”. Singh et al. (2014) provides generally accepted factors affecting social vulnerability which include:
In addition to these factors, but more focused on vulnerability that is dependent on the built environment in a society:

- Distance to nearest hospital (long distances decreases access to this lifeline and increase risk vulnerability).
- Population and housing density (high population density makes evacuation harder and increase risk of losses).
- Age of building stocks (high rate of buildings built before 1980 means higher vulnerability since they are generally built with less strict construction requirement compared to newer buildings).
- Average age of sewers and water pipelines (old water and wastewater management system are more vulnerable to natural hazards and hence are the people depending on them).
- Length of municipal roads (long roads have a higher risk of being damaged during an environmental hazard occurrence).
- Number of exit routes per 1000 habitants (fewer exit routes increases vulnerability due to a more complicated evacuation process)

(p.72&73).

A definition of vulnerability is given by Westgate and O'Keefe (1976) that describe the concept as: “the degree to which a community is at risk from the occurrence of extreme physical or natural phenomena, where risk refers to the probability of occurrence and the degree to which socio-economic and socio-political factors affect the community’s capacity to absorb and recover from extreme phenomena”. Another contributor to the concept of vulnerability is given by Varley (1991), who sees vulnerability as the degree of ability in which people are able to protect themselves and others. This theory obviously is related to the ability of communities to recover or cope with shocks and changes (Maskey, 1993). In those theories similar factors are used, in Cannon’s (1993) theory, different factors are used. Cannon sees vulnerability as “a characteristic of individuals and groups of people who inhabit a given natural, social and economic space, within which they are differentiated according to their varying position in society into more or less vulnerable individuals and groups. It is a complex characteristics produced by a combination of factors derived especially from class, gender, or ethnicity” (p.97).

Furthermore, Cannon divided the concept vulnerability in three different parts:

- Livelihood resilience: which can be seen as the capability of an individual or group to cope with the impact of a hazard.
- Health: the state of health of an individual or group can have serious influence on the capability to cope with situations.
- Preparedness: the willingness of people to act by themselves, and social factors.

This vulnerability is not evenly divided over the world, but occurs differently in various locations. Adger (2006) explains vulnerability as the exposure to perturbations or external stresses, sensitivity to perturbation, and the capacity to adapt. The socio-economic systems can be vulnerable for one thing and not for the other. Resilience is connected with vulnerability, because the more vulnerable
something is, the more resilience is needed. Vulnerability is also seen as susceptible, this means that the system makes transformations before a confrontation with the disturbance occurs (Gallopín, 2006).

**Resilience**

In the definition of vulnerability by Cannon (1993), resilience is mentioned, but what is resilience exactly? Resilience comes from the Latin word *resilire*, which means spring back or rebound (Wheeler & Beatley, 2014). Resilience can be split into engineering resilience and ecological resilience. There is an important difference between engineering resilience and ecological resilience. Engineering resilience is about returning back to the only equilibrium, whereas ecological resilience can have multiple equilibria (Holling, 1996). Resilience can thus be defined in a couple of different ways. The dictionary describes resilience in two ways. First as “the power or ability to return to the original form, position, after being bent, compressed or stretched”. The dictionary also describes resilience as “the ability to recover readily from illness, depression, adversity, or the like. As key terms it gives elasticity and buoyancy” (dictionary, n.d.). What can be derived from these two definitions is, that resilience is the action which is bringing you back to the origin. According to Ward (2007), a resilient system is adaptable and diverse. It has some redundancy built in. A resilient perspective acknowledges that change is constant and predicting is difficult in a world that is complex and dynamic. Another interesting statement about resilience was made by Folke et al. (2002). They argue that management that accepts uncertainty and seeks to build resilience can sustain social-ecological systems, especially during periods of transformation following disturbance. Another contributor of literature about resilience, is The Puget Sound group from the University of Washington. In search for a better understanding of ecological resilience in urban ecosystems, they describe resilience as a concept and a theory with a growing appeal in the disciplines of ecology and planning and emphasizes on equilibrium and stability. The United Nations defines resilience as: “the ability to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change” (Wheeler & Beatley, 2014). The main difference between resilience and sustainability is, “that mainstream approaches to sustainability assume stability if not expansion in the energy flows available to humanity even if there are major transitions in the nature of the energy sources. Consequently, continuity of many of the structures underpinning current social and economic systems is assumed. Whereas resilience is based on energy descent, major social and economic transformation, and is more locally-based and focused” (Barry, 2012).

A more applicable form of resilience to this research is named by Platts-Fowler and Robinson (2013) and is; neighbourhood resilience. Neighbourhood resilience is defined as “the existence, development and engagement of local resources by community members to thrive in an environment characterised by change, uncertainty, unpredictability, and surprise”. Neighbourhood resilience can be measured by the level of unemployment, income levels and deprivation within a neighbourhood. A neighbourhood is resilient when the area is showing better outcomes than expected, seen the intensity of stress and pressure that the neighbourhood is exposed to. If a neighbourhood is resilient depends on a couple of different factors:

- **Economic**: the economic resources available to a community for the welfare of its population, including individually and collectively held financial resources available for investment in business development and civic and social enterprise.

- **Social**: the ability and willingness of community members to get along together, support one another, and participate in actions directed at community objectives. For the most part, social support captures helping behaviours within family and friendship networks, but it also encompasses members' experiences and perceptions of the wider community, including interpersonal trust, sense of belonging, and tolerance of diversity. Research has found that these perceptions of community are often related to other neighbourhood phenomena, such as levels of crime, deprivation, satisfaction with the Council and local services, and whether
members feel their local area is a good place to live. Another dimension of social capital is the presence of organisational structures within a community, including small groups such as committees, churches, and youth groups. These organisational structures represent the ways in which members of the community come together to socialise and address concerns and problems. The existence of organisational structures, the level at which these organisations function, and the linkages between organisations are critical to community empowerment.

- **Cultural**: the ways in which community members ‘know’ the world, their values, and their assumptions about how things work, including rules relating to power and influence. Members’ shared understandings of reality contribute to a sense of place and connectedness that in turn affect resilience.
- **Human**: individuals’ innate or acquired attributes, whether latent or manifest, such as labour force activity, training, skills and knowledge, physical health and mental well-being. These human resources will influence and, perhaps, enhance the capacity of individuals to contribute to community resilience.
- **Political**: community members’ ability to access resources, power, and influence decisions that affect the community. It reflects members’ capacity to express themselves and to participate as agents in their own community.
- **Natural**: these are resources and ecosystem services from the natural world.
- **Built**: these are a community’s physical assets and built infrastructure, for example homes, schools, roads, office buildings, factories, community buildings and public spaces.
- **Information and communication**: good communication is essential for community competence and resilience. In emergency situations, information and communication are vital. People need accurate information about the presenting danger and behavioural options, and they need it quickly. When facing longer-term stress, information and communication will be similarly important. As well as being correct, and appropriately transmitted, it is important that the source of the information is trusted. Some communities are more likely to trust local sources of information than unfamiliar distant ones.

(Platts-Fowler & Robinson, 2013 p. 6&7)

Community resilience is another applicable form of resilience in the case of the Code River Area and is defined as “the ability to respond and adapt positively to change, significant risk, or adversity” (Platts-Fowler & Robinson, 2013, p.8).

** Lahars **

The growth of population and the expansion of settlements in zones around volcanoes, implies that the impact of the eruption of volcanoes is increasing. There are several different outcomes a volcano is able to cause. It can damage infrastructure, environment, and people. People can be injured or even killed, but also their livelihoods can be damaged. More specifically focussed on the Merapi, eruptions in the past have caused several effects of loss, such as environmental degradation, loss of life, and property. Only in eruptions in the 20th century over 400 people were killed and 500 houses were damaged. These losses are mostly caused by lahars and pyroclastic flows (Rachmawati & budiarti, 2016). Lahars are a “type of fragmental debris flow”, that are “necessarily direct products of an eruption even though they are indirectly of volcanic origin”. The name for the phenomenon is originally from Indonesia where the lahars are very common. The lahars used to be given the name ‘mudflows’, this term is not used anymore, since the name does not imply a volcanic origin. The lahars that can contain different sizes of rocks mixed with water can flow down the slopes with high speeds that can cause serious destructions. The temperature of the lahars are normally low, except when with an eruption volcanic materials that maintained their heat flow come in the lahars. Another outcome of an eruption of volcanoes can be pyroclastic flows. “Pyroclastic flows are
suspensions of hot pyroclasts, gas and lithic fragments that are propelled across the ground surface either by gravity or by directed explosions” (Bardintzeff & McCirney, 2000). As mentioned earlier, in case of the Merapi lahars and pyroclastic flows are the most hazardous outcomes of eruptions. An important factor that makes lahars so dangerous in this area is; the Code river goes through the city of Yogyakarta and starts upstream at the Merapi volcano. Therefore, the lahar is following the stream of the Code River and brings high water and flooding’s (Rachmawati & Kingsma, 2013).

**Perception of risk**

Despite the activity around the volcano, people keep living in the dangerous areas around the Merapi volcano. Why do people keep living around this dangerous volcano? An important point related to this is, every person experiences danger differently. The level people react on danger differs per person and is called the perception of risk. The level people experience hazards depends on several factors. For example, scientists have a higher perception of risks, then a layman has (Vlakveld et al., 2008). To elaborate more on this perception of risk it is important to know, what subjective- and objective safeness is. Subjective safeness is the level of safeness people experience at a certain place. This feeling can be different for every individual and is associated with the personal situation of a person. Some people are more fearful about becoming a victim than others. On the other hand, this feeling of fear can be contributed by the amount of criminality in a society. Another factor in subjective safeness is the cognitive feeling of safeness. This cognitive feeling is built on by the judgement of people on the situation of becoming a victim, in this case by natural hazards, themselves. This judgement can be influenced by experiences of being a victim in the past or someone from their social life, but also because of coverage from the media. This subjective unsafe feeling has a strong affective component. The threat of supposed danger is associated with actual fear. This threat can be actual fear, for example when somebody is pointed on by a gun. Another threat can be anticipated fear or anxiety, then there will be no actual threat. This is the case when people are scared to walk alone in the dark. There might be actual danger, but on the other hand there is a big chance there is no actual danger. This subjective safeness has a couple of outcomes. It can cause more stress and depressions and more factual points. Summarized outcomes of this subjective safeness can lead to a lower quality of life and the reactions in behaviour can lead to a vicious circle and have an even bigger influence on the quality of life (De Meij, 2010). Media has a big influence on the subjective safeness, the more sensational journalists talk about an incident the more fearful people will become (Boers, 2008). The other aspect of safeness is objective safeness. When people talk about objective safeness they speak about the amount of incidents that occur. The factual chance that something will happen, this level is measured by the amount and the level of incidents. Statistics and registrations of incidents give a good measurement of the objective safeness. Important to mention, scientists and layman often have a different look on the aspects of danger. This is caused by the fact that scientists know what the objective facts are, and layman mostly rely on subjective facts (De Meij, 2010).
2.2 Conceptual model

Figure 4, displays the relations between the different concepts in this research

In this research theories about modernist- (top-down planning) and postmodernist (bottom-up planning) approach of planning are most evident. The differences between these two planning approaches are vital during this research, the participation of residents is the biggest difference between the two planning approaches. The modernist planning approach is done by experts and is top-down without any interference from residents, whereas the postmodernist planning approach is based on letting the residents participate and determining what should be on the planning agenda and help in the process. Experts have more knowledge about the concepts, however their planning is for the residents of the neighbourhood. The residents of the neighbourhood on their behalf know better what they want, which makes them more satisfied. In this research the relation between the two types of planning and vulnerability, as well as the relation between the vulnerability of a neighbourhood and the resilience of a neighbourhood, will be explained.

Vulnerability and resilience also play a vital role in this research. The concepts vulnerability and resilience are central in the conceptual model since they relate to all concepts. For example, the vulnerability and resilience of the residents determines what the impact of the natural hazard is. On the other hand, the impact of a natural hazard influences the vulnerability and resilience of the residents. Furthermore, the concepts vulnerability and resilience are both related to the knowledge and participation of residents, as knowledge and participation will make the vulnerability sink and the resilience rise. Knowledge and participation of residents are brought in relation with each other in the conceptual model, since knowledge about the dangers could create participation of the residents and participation by residents in the planning process will make their knowledge increase. This is due to the fact that; when experts and the residents of neighborhoods are going to cooperate, the knowledge of the experts will be transferred to the residents and the residents are better able to communicate their wishes. Due to the knowledge the residents get, the vulnerability of the residents of the neighbourhood might reduce and the resilience might build up.

In this case, the theories on planning approaches can be seen as fundamental theories. Both modernist and postmodernist approaches of planning are theories that can change our view on the world. The other vital concepts: vulnerability and resilience are both substantive theories. This means that these theories are specific for certain situations. All concepts can be used in different situations, but the concept changes in this specific research. The meaning of these concepts in planning are different from the meaning of these concepts in other subjects.
3.0 Methodology

In this part the most important concepts will be operationalised, which will be followed by an explanation about the chosen methodology and strategy of the research. After that the manner of gathering data is explained followed by an elaboration on how this data is analysed. At last there is a list of respondents and a reflection about the gathering of our data.

3.1 Operationalisation

Modernist planning approach: The top-down planning approach, where ideas and decisions are made by experts, and applied on the situation. The community is not involved in this process. Experts who stand outside the situation use their professional knowledge to overcome the problems. The indicator for modernist planning can be questions asked to the interviewees about how much influence they have in the planning process.

Postmodernist planning approach: The bottom-up planning approach, where ideas and decisions are for a big part created by the community itself. The community is highly involved and works together with experts. The indicator for a use of postmodernist planning approach can be found in the answer of interviewees on the question what their influence in the planning process.

Subjective safeness: Subjective safeness is a concept that is focussed on if people’s safeness, which makes it subjective. It can be measured by asking questions whether they feel unsafe in their environment, in this research the safeness towards the Merapi. These questions can be asked twice, in the situation of top-down planning and in the situation of bottom-up planning.

Objective safeness: Objective safeness is a concept that is focussed on how safe an environment factual is. It is based on facts, that are mostly provided by experts. It can be measured by the amount of damage that is done by the Merapi in case of the regular approach of planning (top-down planning) and the amount of deaths that it has caused in the past. These statistics can be found at websites of national agencies for example.

Risk perception: Risk perception is a concept that describes how people react on risk, are they aware of the risks, or do they have a nonchalant attitude towards the risks. This can be measured by asking questions about how the residents think of the lahars, how the residents would deal with the occurrence of a lahar, followed by the question if they would feel safer if other measurements would be applied.

Vulnerability: Vulnerability is focussed to what extent people can handle the situation. What are the parts that are easily affected, and in which parts are they able to defend. Vulnerability can be measured by asking questions; how much people suffer in different disciplines when a lahar occurs. What are their strengths and what are their weaknesses. By looking at the vulnerable parts of the residents in this situation of top-down planning, can be looked about what can be improved and how postmodernist approach of planning can help.

Resilience: Resilience has similarities with vulnerability. The resilience of a community is the ability to cope with external factors, such as the occurrence of a lahar. Resilience can be measured by asking how people cope with the lahars.

The theoretical framework which has been built does not give any reason to change the provisional research model, since the correlation between the theories is not significant.
3.2 Methodology used in this research

This chapter will give an overview of the methodology used in this research. There are two main types of researches: quantitative research and qualitative research. Quantitative research is more analytical, and provides empirical support for hypotheses in numbers and calculations (Myers, 2000). Qualitative research tries to get a more in-depth view on the research subject. Qualitative research is able to capture interactions between people with statistical methods (Creswell, 2012). So qualitative research goes more in-depth, but works with a smaller number of respondents, which makes it harder to generalize over a bigger population. The small group of respondents makes, that the reliability for bigger groups is smaller in case of qualitative research (Myers, 2000). This research will be more about questions with “how and why” instead of “what, where & when”. Qualitative research typically answers the question of “how & why” and gives a more in-depth view on the subject, whereas quantitative research mostly answers the question of “what where & when” gives less in-depth, but provides more data in numbers etcetera (Vennix, 2012). There are five types of strategies for research: survey-research, experiment, case study, grounded theory, and desk research.

This research is built upon a case study. A case study is a research strategy whereby the researcher tries to gain a deeper, integral insight in one or several time-space bounded objects or processes (Vennix, 2012). A case study is a good strategy for this research. In a certain way this research was already framed into a case study. This case shows the results of a lahar in the Code River Area (Yogyakarta) caused by an eruption of the Merapi volcano. Since, there are a lot more of these kind of situations in the world, it can be seen as a case study. On the other side, this research does contribute to the theory about the use of planning and the choice of which planning should be used in the case of the occurrence of a natural hazard/disaster, which makes it a more universal research that uses a combination of strategies.

3.2.1 Applied research strategy

The goal of this research is to create a better understanding, and thus more in-depth insights in using planning approaches in a certain situation. In this research the particular case of natural hazards/disasters, caused by the Merapi, in the Code river Area will be elaborated on. The methodology will explain how the goal of this research will be achieved. As mentioned earlier, this research will be qualitative. This research is focussed on a particular combined with qualitative research. A case-study searches for deep and integral insights about one or several space-time bounded objects or processes (Vennix, 2012). This data can be gathered from different sources, which is also known as triangulation. Note that it is important to study a strategical sample instead of a random sample, since results could be of use in similar situations (Verschuren & Doorewaard, 2007). The difference between quantitative- and qualitative research within a case-study can be found in that qualitative research makes use of triangulation and applying member checks to a case study. This also makes it an interpretative research (Vennix, 2012).

A case study is a deductive form of research, since it moves from general ideas and theories to a more specific situation. A case study can be explorative, descriptive, and explanatory (Vennix, 2012). This research will be a combination of those three, since this research will describe the particular case, declares what goes wrong, and tries to explore in-depth insights on order to create better solutions by talking with residents and experts.

On top of that a case study can be divided into different forms, this case will be an intrinsic case study. This case focuses on one particular case to illustrate the problem, which makes it intrinsic. The intrinsic case study can be divided into a single-case design in the holistic manner and a single-case
design in the embedded manner. The difference between those two is, that in the holistic manner the focus lays only on this particular case, whereas in the embedded manner this case is divided into sub-units (Yin, 2003). This specific case focuses on the Code River Area, which is a big area with many differences. To create more internal validity, I chose to do interviews in three different sub-units of the case Code River Area. These three different sub-units are three different kampungs on the river banks of the Code river near the centre of the city who suffer from lahars. The contribution of the usage of three different sub-locations to the internal validity means it is an embedded intrinsic case study.

The internal validity is contributed by the embedded intrinsic case study this research is shaped into. The external validity of a case study in general is higher than for example the external validity of an experiment, since the research of the particular case is done in the natural context (Vennix, 2012). The problem with an intrinsic case-study, and qualitative research in general is, that there are less respondents. This makes it harder to generalize results, and makes the external validity descend (Verschuren & Doorewaard, 2007).

3.2.2 Data collection

Data can be gained in multiple ways in a case study, which makes the validity of the case study higher. To make this a strong case study, different information sources are used to gather data. One of these sources were interviews. Interviews give insight in how residents feel, what they think and what they know. The interviews were held individually, which means that there was only one respondent at the time. During the interviews an open and half structured interview method was used. In an open interview, the interviewer uses questions to find the point of view of the interviewee about certain subjects and concepts (Baarde et al., 2005). An open interview can also be referred to as a topic interview in which the questioning is open, but the subjects were already known. A half structured interview is a structure in which the subjects about the most important questions are already known. The half structured interview is used in this research to get to know the general information of the interviewee (Baarde, et al. 2005). Data was gathered by holding interviews with residents and experts. These interviews provide deeper insights of the situation in multiple dimensions. Experts have the knowledge to cope with things like lahars, and residents know best what their wishes are. By this dual insight already the dualism between modernist- and postmodernist approach of planning, already the goal of the research is embedded. Another reason for the choice of interviewing residents as well as experts is, that some subjects are hard to understand or sensitive for residents to talk about. The interviews provided opinions and quotes of residents about their view on the situation at the moment. Two different interview guides were created, one for the experts and one for the residents, to make it more understandable for the residents and gather deeper insights from the experts. During the interviews a half structured interview was carried out, which was very useful for asking people why they think they are vulnerable, or less resilient, for natural hazards/disasters. and then gather more information by adapting to their answers and asking new questions that follow up their answers.

Another information source for gathering qualitative data, was already existing literature about the main concepts, such as planning approaches, vulnerability and resilience. By extracting qualitative data from documents and already existing literature, which made a contribution to a more complete research. This literature was found this by using search engines, like for example google, but also using the library. On the internet there is a lot of (scientific) literature about planning and planning approaches, also about the concept of vulnerability there is enough literature to be found. About resilience there is less to be found, because this is a relatively new concept in urban planning.
Besides those two ways there was another opportunity for me to gain qualitative data. This is audio-visual data. This data can be found in interviews on YouTube for example. This gave insight in what experts from all over the world think about the planning approaches and their information was used for further research.

The last way qualitative data was gathered in this case study was a site visit. In a site visit you do observations about the site itself. By doing observations on the site it is easier to place yourself in the minds of the people that live in the area. The observer sees how the people live and is able to get into contact with them, which gives you a first impression of the residents.

Those interviews were recorded and used to gather information for this case. Since research was conducted in a low-educated area, the residents did not speak English. In order to overcome this language barrier, a collaboration with students of the Gadjah Mada Universitas was set up, the students served as translators and helped with finding respondents in the right areas. During the interviews they told the headlines so further questioning was possible to gain deeper insights, and after the interviews a summary was made, so the information could be used. Multiple interviews, in multiple areas in the Code River Area were held, to increase the internal validity of the data. Other data was gathered out of earlier produced literature. This literature review gives information about meaning of concepts, links between concepts and gives information about theories. The combination between the two methods of finding data, interviews and literature review, make that there is triangulation in methods. Triangulation of methods makes the data more trustful (Vennix, 2012).

<table>
<thead>
<tr>
<th>Observations schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wednesday 22 march 2017</strong></td>
</tr>
<tr>
<td>11:00 – 14:00</td>
</tr>
<tr>
<td><strong>Saturday 25 march 2017</strong></td>
</tr>
<tr>
<td><strong>Monday 28 march 2017</strong></td>
</tr>
</tbody>
</table>

*Figure 7, shows the schedule of our observations in the three different kampungs (kampungs) (Lammes, 2017)*
<table>
<thead>
<tr>
<th>Respondents</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agus</td>
<td>Resident of Tukangan kampung, works as entrepreneur and taxi driver, private owner of his house.</td>
</tr>
<tr>
<td>Sugeng</td>
<td>Community leader of the Ledok code kampung, also known as ‘artist kampung’. Works as a freelance operator, private owner of his house.</td>
</tr>
<tr>
<td>Fitri Aminah</td>
<td>Resident of the Ledok code kampung, unemployed, private owner of her house.</td>
</tr>
<tr>
<td>Sugeng Purwanto</td>
<td>Community leader of the Jogoyudan code kampung, works as an entrepreneur, rents a Rumah Susun.</td>
</tr>
<tr>
<td>Sri Mulyani</td>
<td>Resident of the Jogoyudan code kampung, works as entrepreneur, private owner of her house.</td>
</tr>
<tr>
<td>Sri Wijilestari</td>
<td>Resident of the code riverside, works as an entrepreneur, private owner of the house.</td>
</tr>
<tr>
<td>Mr. Trisan Three (Tri)</td>
<td>Resident of the Tukangan kampung, is a student, his house is privately owned.</td>
</tr>
<tr>
<td>Dr. Estuning Tyas Wulan Mei S.Si., M.Si., M.Sc.</td>
<td>A supervisor of the project with UGM who has done her a master on the subject of Spatial Planning and Risk management. She wrote her thesis about: land use planning for settlements area considering flood and landslide hazards in Bagelen Sub-district in Central java.</td>
</tr>
<tr>
<td>Dr. Rini Rachmawati S.Si, M.T.</td>
<td>Another supervisor of the project who did her undergraduate in Geography and her master in urban- and regional planning at UGM. She already did research about the Code River Area.</td>
</tr>
<tr>
<td>Dr. Djaka Marwasta S.Si, M.Si</td>
<td>Another supervisor of the project who did his undergraduate and master on the topic geography.</td>
</tr>
</tbody>
</table>

*Figure 5, list of the respondents we interviewed with some background information*
### Participants of the research

<table>
<thead>
<tr>
<th>Resident</th>
<th>Name</th>
<th>Sex</th>
<th>Age</th>
<th>Income</th>
<th>Education level</th>
<th>Kampung</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Sugeng</td>
<td>Male</td>
<td>33</td>
<td>800.000 RP</td>
<td>Elementary school</td>
<td>Ledokcode</td>
</tr>
<tr>
<td>2</td>
<td>Mrs. Fitri Aminah</td>
<td>Female</td>
<td>34</td>
<td>0 RP</td>
<td>Elementary school</td>
<td>Ledokcode</td>
</tr>
<tr>
<td>3</td>
<td>Mr. Sugeng Purwanto</td>
<td>Male</td>
<td>58</td>
<td>1.300.000 RP</td>
<td>Junior Highschool</td>
<td>Jogoyudan</td>
</tr>
<tr>
<td>4</td>
<td>Mrs. Sri Mulyani</td>
<td>Female</td>
<td>53</td>
<td>1.000.000 RP</td>
<td>Elementary school</td>
<td>Jogoyudan</td>
</tr>
<tr>
<td>5</td>
<td>Mrs. Sri Wijlestra</td>
<td>Female</td>
<td>47</td>
<td>5.000.000 RP</td>
<td>University degree</td>
<td>Tukangan</td>
</tr>
<tr>
<td>6</td>
<td>Mr. Trisan Three</td>
<td>Male</td>
<td>18</td>
<td>0 RP</td>
<td>Vocational High School</td>
<td>Ledokcode</td>
</tr>
<tr>
<td>7</td>
<td>Mr. Agus Sutanto</td>
<td>Male</td>
<td>42</td>
<td>2.500.000 RP</td>
<td>Junior Highschool</td>
<td>Tukangan</td>
</tr>
<tr>
<td>8</td>
<td>Dr. Dijaka Marwasta S.Si, M.T.</td>
<td>Male</td>
<td>46</td>
<td>5.000.000 RP</td>
<td>PhD</td>
<td>Kampung is located in the Sleman Regency</td>
</tr>
<tr>
<td>9</td>
<td>Dr. Rini Rachmawati S.Si, M.t.</td>
<td>Female</td>
<td>-</td>
<td>-</td>
<td>PhD</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Estuning Tyas Wulan Mei S.Si, M.Si., M.Sc.</td>
<td>Female</td>
<td>-</td>
<td>-</td>
<td>PhD</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 6, gives some general information about the participants (Lammas, 2017)

#### 3.2.3 Data analysis

Data was gathered during the research by interviewing residents of the Code river area and experts of the Gadjah Mada University. Those interviews were taped and interviews in English were transcribed and coded. The other interviews in the Indonesian language (Bahasa) were explained and translated and an additional summary was provided. Multiple interviews were done to make the data more trustworthy. Interviews will give the opportunity to dig deeper into phenomenon’s, which is in line with the research goal. As a result of that the interviews give a good content validity for this research. After the transcriptions, the interviews were coded with open coding. Open coding is a way to remark everything that seems interesting to use in the analysis. Next to that, axial coding was used to put open codes that are related to each other together in one code. Related open codes were thus brought together and formed into a new code. Those new codes were formed and specified to the main concepts of the conceptual model in this research. The new code is brought together with the related concept, which is also called selective coding. Examples of the process of coding can be found in the appendix. The other data will be gathered out of earlier produced literature. This literature review gives information about meaning of concepts, links between concepts and gives information about theories. The combination between the two methods of finding data, interviews and literature review, make that there is triangulation in methods. Triangulation of methods make the data more trustful (Vennix, 2012).
3.3 Reflection

Gathering data in an unknown foreign country can be difficult. In this reflection, an evaluation will be given on the difficulties encountered. First, entering the field was quite easy, since local students provided help during the period of data gathering. Those local students were appointed by supervisors and were familiar with the culture and the way people wanted to be treated. This made it even easier to enter the Code River Area was. that we met Tri almost immediately when we entered the kampung. Tri wanted to help us with finding respondents and translating, so he could learn better English. What really helped in feeling comfortable in a deprived area like the Code River Area, was the kindness of the people.

The second challenge was, that we chose to work in a group of three, but still we all had different subjects on similar topics in the Code River Area. So it was not that our researches had nothing to do with each other, but still we had to give everybody space to do their part of their interviews and field experiences. The cooperation between me and my fellow researchers actually went quite smoothly. We gave each other their space and all of us were just very interested in the kampung. For us it was a true culture shock which made it quite easy to do our field research since we were very interested.

Another challenge was the language barrier. In order to overcome this language barrier we came together with our supervisors to a better understanding and two students were appointed to help us with our interviews. This made it possible to even do interviews with locals of the Code River Area, because almost no one is able to talk English in this area, especially on our topics. One exception was Tri, who is a student that lives with his family in the Code River Area. Tri talked English quite good and showed us around his kampung and other kampungs. He also helped us finding respondents, especially because we wanted to talk to community leaders, this was very helpful. With the help of the two students, Faricha Kurniadhini and Ratih Paniti Sari, and Tri we were able to do our interviews. After the interviews we mostly went for some food or a drink to thank them and talk about what was told by the respondents that day. This helped us to overcome the language barrier that is there for certain.
4.0 Analysing the research area

In this chapter the empirical side of the research will be elaborated on. The different concepts named earlier in the chapter ‘theory’s and concepts’ are used together with data gathered from the interviews and the site visits.

4.1 Where did the research take place?

My research is done in Indonesia and to be precisely in the Code river area in Yogyakarta. To give a better view on the situation I will elaborate on the location of my research by showing a couple of maps.

![Map of Indonesia](image1.jpg)

*Figure 7, shows a map of Indonesia (CIA World Factbook, 2014)*

Above you find a map of Indonesia. As you can see the country Indonesia consists of multiple big islands and a lot of small islands, which is together called the Indonesian archipelago. The Indonesian archipelago consists of approximately 17,000 islands, of which several big islands: Sumatra, Java, Borneo, Sulawesi, Timor islands, the Moluccas, and Papua New-Guinea. As earlier mentioned my research will only focus on the island of Java. The research of this bachelor thesis will be held in Indonesia, and to be more specific in Yogyakarta. Yogyakarta is a city in the middle of the island Java. As said before Java is an island that belongs to the country Indonesia. With 76 historically active volcanoes, it actually counts the most historically active volcanoes in the world. The total amount of eruptions is with 1171 just a little beneath the amount Japan has faced (1274). The reason of the big amount of activity in this area is the presence of a zone of subduction. This zone is called the Sunda Volcanic Arc, where the heavier Indian Ocean crust dives beneath the Asian Plate. This zone of subduction covers over 3000 kilometers, with the result that 76% of volcanism in the region is caused by this Sunda Volcanic Arc. One of those volcanoes that is caused by the Sunda Volcanic Arc is the Merapi. The Merapi is a volcano on the island Java near the city region of Yogyakarta. The Merapi is an active volcano that erupted for the last time in 2015, which killed 38 people (Newsday, 2015). The Merapi Volcano is one of the world’s most active volcanoes, which erupts with intervals of one to five years.
Above you see a map of the island Java. Java is the island where Yogyakarta is located on. I made a red circle around the area where Yogyakarta is located on Java. Java counts a couple of more big cities, of which one is the capital: Jakarta. Other big cities on Java are: Semarang, Bandung, and Surabaya. Java has three different provinces: West-Java, Central Java, and East-Java. Yogyakarta is located in the south of Central-Java. Java is the fifth biggest islands of the Indonesian archipelago and covers only one seventh of the total land area in Indonesia. Despite this, Java carry’s two third of the country’s total population, which makes it a really densely populated area (The Columbia Encyclopedia, 2017).

As you can see on the map above the Merapi is located in the north of the map. The Code river area is located in the centre of Yogyakarta as you can see on the next map.
Above you can find the central area of Yogyakarta, with Malioboro street as the most busy street in the city centre of Yogyakarta. A little bit to the right from the Malioboro street you can find the Code river. On the map it does not seem like there is a lot to do around the Code river, but in reality there are a lot of small settlements with narrow alleys/streets on the area around the river, which is also called the Code river area. The three different coloured polygons are the three kampungs where my research took place.
4.2 Analysing the Code River Area

4.2.1 Introduction

In the 1950s and 1960s a lot of people came to the city and started to live in the Code river area, because it was cheap and also because they hoped for a better life with a good job in the city. The people that came to live in the Code river area were mostly people with a low income and a low level of education (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). On the picture on the right side, you can get a first impression of the situation in the area. In the picture you can see the Code river and small urban settlements in the opposite side of the river. This picture is taken from the other side, which is also part of the Code River Area. The Code river divides the Code river area in two sides. We visited the Ledok code kampung, also known as ‘Artist kampung’, Tukangan kampung and the Jogoyudan kampung. As said earlier, these kampungs are located on the river banks of the Code river. Normally this river is able to transfer the water in a way that is not dangerous for the residents of the Code river area, but in the case of lahars the river is not able to cope with the extreme water regimes.

4.2.2 Natural hazards

Lahar is a concept that finds its origins in the Javanese language and was first used by Scrivenor (1929), who defined the lahar as a ‘mudstream’. Later on the definition was expanded and lahar was defined as “a mudflow, containing debris and angular blocks of chiefly volcanic origin”. Later on it was defined at an international conference of volcanioclastic sedimentologists as a “a rapidly flowing mixture of rock debris and water (other than normal streamflow) from a volcano”. The deposition, the lahar delivers is around 280 km$^2$ of the slopes of Merapi and the lowlands that surround it. Lahars have to be triggered by heavy rainfall, >25mm/h, which has happened at least 23 of the 61 eruption since the mid-1500s. There is also a big difference in power between lahars, which is influenced by the duration of the rainfall and the permeability of pyroclastic deposits (Lavigne et.al., 2000). As earlier mentioned in case of the Merapi lahars and pyroclastic flows are the most hazardous outcomes of eruptions. An important factor that makes lahars so dangerous in the area is, that de Code river goes through the city of Yogyakarta and starts upstream at the Merapi volcano, which can be seen in the map below. This makes that the lahar is following the stream of the Code River and brings high water and floodings (Rachmawati & Kingsma, 2013). It depends on the direction in which the pyroclastic flow is directing how big the amount of sediment in the area will be. The amount of sediment plays an important role in social and economic problems (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). In the map on the next page can be seen where lahar deposits were located after recent eruptions of the Merapi.
The Code river area suffers from the occurrence of the lahars, because of the flooding and the sedimentation of the lahars, which makes houses in the area slink into deep sediment. This can be seen on the picture below on the right. In the picture you see a house that was left unoccupied after the last lahar in 2010. In the interviews with local residents of the neighbourhood, they mentioned that in case of lahars they build a new house, or they higher up their former homes just like in the left picture below. Where the green stops, is where the roof used to be before the lahar in 2010. The area suffers more from lahars than the rest of the city, which makes it a marginalized area compared to the rest of the city. In order to cope with a lahar, without people or housed being affected. According to Dr. Rini Rachmawati (personal communication, April 3, 2017), “20 to 25 meters should be free from the river, because when the flood of the lahar came in 2010 the impact was about 25 meters from the river bank”.

Figure 12, a map of locations deposits of the lahar (Rachmawati & Kingsma, 2013)

Figure 13, Photos of settlements in the Code River Area, inside and outside. On the left picture is displayed where the roof used to be (green layer) before they heightened the house as a result of the lahar
4.2.3 Spatial- and social justice in the Code River Area

Earlier was already mentioned that the Code River Area suffers more from lahars than other parts of the city and is named as a marginalized area in the city. It was also mentioned that residents of the Code River Area mostly have a low income compared to the rest of the people in the city. Since they suffer more and have less resources to cope with a lahar, makes it a spatially- and social unjust place compared to the rest of the city (Dr. Rini Rachmawati, personal communication, April 3, 2017). That the uneven distribution of the burdens of the occurrence of a lahar, can be related to the concepts of spatial justice is contributed by several authors. Two of these authors are Knox & Marston (2012), who define spatial justice as followed: “consider the distribution of society’s benefits and burdens at different spatial scales, taking into account both variations in people’s need and in their contribution to the production of wealth and social well-being a lot of people, nations, and ethnic groups around the world feel marginalized, exploited, and neglected as a result of the quickening pace of change” (p.67). Whereas Social justice has more to do with the uneven distribution of these inequalities between different social groups (Harvey, 2010). Soja (2009) describes spatial justice as followed: “The starting point of spatial justice involves the fair and equitable distribution in space of socially valued resources and the opportunities to use them. Spatial justice is not a substitute or alternative to social, economic, or other forms of justice but rather a way of looking at justice from a critical spatial perspective” (p.2). Soja (2009) also mentions locational discrimination, which he sees as the situation that occurs because of the “biases imposed on certain populations because of their geographical location” (p.3). In the Code River Area this geographical location is vital, since according to Dr. Rini Rachmawati (personal communication, April 3, 2017), 20 to 25 meters around the river should be cleared out to be sure that no one will be affected by the lahar, which is not the case in the Code River Area. This geographical location is “fundamental to create spatial injustice and the creation of lasting spatial structures of privilege and advantage” (p.3.). The three main influencers of this are class, race and gender (Soja, 2009). An area which is affected by spatial injustice can come into downward spiral move, which is known as cumulative causation. Cumulative causation can lead to a positive upward spiral as well as to a negative downward spiral. The positive upward spiral is caused by positive developments in a region that lead to more positive developments. The negative downward spiral is caused by negative developments that lead to more negative developments in the area. Solutions to break through this negative spiral are strongly associated with governmental actions, but can also come from ’spontaneous’ development projects such as Foreign Direct Investments or efforts from the community itself (Pijpers, 2014).
4.2.4 Vulnerability

The spatial- and social injustice of the Code River Area is strongly correlated with the vulnerability of the residents of this area (Dr. Rini Rachmawati, personal communication, April 3, 2017). Vulnerability is a broad concept that comes in a lot of different forms. To start, vulnerability can be divided into natural vulnerability and human vulnerability as can be seen in the figure below.

![Figure 2](image_url)

*Figure 2 that explains the concept of vulnerability and the relation to natural disasters (Alcántara-Ayala, 2002).*

In the figure of Alcántara-Ayala (2002) makes a distinction between natural vulnerability and human vulnerability. Natural vulnerability has as possible causes the lithosphere, biosphere, and atmosphere. On their behalf those factors can cause a natural hazard that leads to the natural vulnerability. On the other side (right) of the figure the causation of human vulnerability is explained. Economical-, social-, cultural-, and political factors together form a society. This society is less or more vulnerable than other societies, because of these four factors that form the society. The human vulnerability together with the natural vulnerability determines if a natural hazard can lead to a natural disaster. A natural disaster arises when a natural hazard happens and this natural hazard affects essential functions of society in a negative way. The occurrence of this natural disasters is not evenly divided over the world, but happens more often in developing countries than in developed countries. Partly this is caused by the location of developing countries, like Indonesia, in more vulnerable areas for natural hazards (Alcántara-Ayala, 2002). This is also confirmed by the CEPAL (Comisión Económica para América Latina) (1999) that state that “the spatial distribution of natural disasters shows a clear tendency to occur in developing countries”. Another reason for the occurrence of more natural disasters in the developing countries is, that they are more vulnerable on the aspect of human vulnerability, since they have less capabilities to cope with a natural hazard. Since its harder for a developing country to deal with a natural hazards, it is more likely that this natural hazard changes into a natural disaster.
To make vulnerability easier to analyse Alcántara-Ayala (2002) divided the concept of human vulnerability into more concrete forms:

- **Materials/economic vulnerability**: a lack of access to resources
- **Social vulnerability**: disintegration of social patterns
- **Organizational vulnerability**: Lack of strong national and local institutional structures
- **Educational vulnerability**: Lack of access to information and knowledge
- **Attitudinal and motivational vulnerability**: lack of public awareness (Nonchalante houding naar lahar)
- **Political vulnerability**: limited access to political power and representation
- **Cultural vulnerability**: certain beliefs and customs
- **Physical vulnerability**: weak building of weak individuals

(p. 119).

**Economic vulnerability**

Materials/economic vulnerability explains the vulnerability that is caused by a lack of access to resources. That there is a certain lack of access to (economic) resources can be seen in the interviews with the residents of the Code river area. A couple of the respondents stated that they would want to leave the Code river area, but were not able to move, because they could not afford it. Even if they can afford to buy a house someplace else, they are not able to maintain their job in the city centre (Sugeng, personal communication, March 23, 2017). Experts on the topic such as Dr. Rini Rachmawati, who is specialised in Urban Geography, Urban Planning, and Cyber City and Region, even brands the Code river area as a potential slum area. On top of that she states that Yogyakarta is an expensive city to buy a house, because the scarcity of the land (Dr. Rini Rachmawati, personal communication, April 3, 2017). According to Dr. Estuning Tyas Wulan Mei, another expert on the topic who did her master in Geo-information for Spatial Planning and Risk Management, there is enough to improve at the Code River area. The Code river area used to be a so called ‘Black area’, but it gets better at the moment. Still it’s hard to build-up everything from the start again after an lahar without any help, but because of an increase in (local) entrepreneurs in the area it is less hard to build everything up from scratch again. For the (local) entrepreneurs it gets easier to solve it without help, but still a lot of people who are not entrepreneurs are struggling to do this. There are some investments of big private investors, such as the CSR, who financed sanitary facilities in the Code river area (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). A good example of economic vulnerability in the Code river area is the bridge that was destroyed by the lahar in 2010 (picture on the right). This bridge is still not restored, because of a lack of financial resources (Tri, personal communication, March 28, 2017). The lack of resources of the residents in the area can be seen as a contribution to the social injustice of the residents compared to other
social groups and because of the lack of resources they are minimized in their ability to improve their areas and livelihoods, which makes the area suffer from spatial injustice compared to other areas in Yogyakarta (Dr. Rini Rachmawati, personal communication, April 3, 2017). The lack of economic resources in the area causes that there are no possibilities for the residents to move and live somewhere in a safer place. Even if it is economically possible to move to somewhere else, they will lose all the social relations they have built up during the time they lived in the Code River Area.

Another reason the residents are not able to move is, because they mostly work in the Malioboro street in the city centre. Residents are not able to get a house on a safer spot near the city centre, because it is too expensive. If they get a house in a safer place, according to the community leader, they lose their job in the city centre as a result of the increasing costs they have to make to transfer to the city centre (Sugeng, personal communication, March 23, 2017).

Social vulnerability

“Social vulnerability is influenced by a variety of factors. Social class is one of the largest contributors to social vulnerability. Social class includes employment (type and stability), income, savings, and education” (Singh et al., 2014, p.72). As mentioned earlier, in 1950s and 1960s a lot people with a low-income started to have a living in the Code River Area and still a lot of people with a low-income and a low education live in the area (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). This means that in the Code river area live people of a low social class, which makes the area vulnerable on the social aspect. The BEVI (Built Environment Index) states factors that influence social vulnerability in the built environment are:

- Distance to nearest hospital (long distances decreases access to this lifeline and increase risk vulnerability)
- Population and housing density (high population density makes evacuation harder and increase risk of losses)
- Age of building stocks (high rate of buildings built before 1980 means higher vulnerability since they are generally built with less strict construction requirement compared to newer buildings)
- Average age of sewers and water pipelines (old water and wastewater management system are more vulnerable to natural hazards and hence are the people depending on them)
- Length of municipal roads (long roads have a higher risk of being damaged during an environmental hazard occurrence)
- Number of exit routes per 1000 habitants (fewer exit routes increases vulnerability due to a more complicated evacuation process)

(Singh et al., 2014, p.73)

These factors are interesting, because the Code River area is a complicated system with narrow alleys and houses that are built close to the other settlements. The housing density is high, which makes it harder to make evacuation process successful. The age of the building stock differs from each other since people come to the area and built their own house, and rebuild it eventually when a lahar strikes their house. Still, the houses are built by themselves, which can have an influence on the quality of the construction since contemporary knowledge of construction-work is not available all the time. Reasons for building their houses by their own are mostly financially, but sometimes emotionally. It is a habit for some Indonesian people to build their home by themselves with their family (Fitri Aminah, personal communication, March 23, 2017). A kampung of the Ledok Code Kampung mentioned that there are two gates, but only one route out of his kampung. Though there are just 112 people living there, one exit route in an area with narrow alleys which are hard to move along in, does not contribute to a good evacuation (Tri, personal communication, March 28, 2017).
Organizational vulnerability

Organizational vulnerability is explained as the lack of local and national institutional structures. There are sufficient institutions in Indonesia to deal with planning problems. These institutions operate with experts who make plans for different areas on different geographic scales, still all institutions have a limited budget which limits them in their interventions (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

Cultural vulnerability

The common culture in Indonesia, when it comes to housing, is that people have a house with a garden. This is interesting, because the government started to build Rumah Susun’. Rumah Susun are apartment complexes that are meant for low-income people such as the people that live in the Code river area. In the Jogoyudan kampung there has already been build two complexes of Rumah Susun. The idea behind the Rumah Susun is to build houses for low-income people to improve their quality of life. An important factor of improvement that comes with the Rumah Susun is, that Rumah Susun are better constructed than the local traditional houses and are also higher, which creates more safety in case of an lahar (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

Educational vulnerability

Educational vulnerability is a concept that reflects on the possibility for people to access information and knowledge. In the Code River Area a lot of people have a low level of education, which makes it harder to access information and knowledge (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). The area thus suffers from educational vulnerability, which can be related to the concept of spatial- and social justice. The distribution of access to information and knowledge in the Code River Area are low, compared to areas with a higher level of education and people with a higher level of education (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). There is a deeper explanation for the low educational level in the Code River Area. People migrated to the city in the quest of finding a job, since there were not enough jobs in the rural areas. The people that migrated were basically farmers with a low educational level. Since the people were low-educated and the big amount of them that moved into the city, a lot of them ended up unemployed or working in the informal economy. The wages are not really high for most of the people in the informal economy. Since the people did not earn a lot of money, they have to think about how to survive with the basic needs. As a result of this, the attention for education of their children was very low and so their children stayed low-educated and came in the same circle as their parents (Kumorotomo et al., 1995).

Attitudinal and motivational vulnerability

This kind of vulnerability refers to a ‘lack of public awareness’. To be able to elaborate on this kind of vulnerability the related concepts: risk perception, subjective- and objective safeness, should be explained. The level people react on dangerous differs per person and is called the perception of risk. The level people experience hazards is depending on several factors. For example scientists have a higher perception of risks, then a layman has (Vlakveld et al., 2008). Subjective safeness is the level of safeness people experience at a certain place. This feeling can be different for every individual and is associated with the personal situation of a person. Some people are more fearful about becoming a victim then others. On the other hand this feeling of fear can be contributed by the amount of criminality in a society. Another factor in subjective safeness is the cognitive feeling of safeness. This cognitive feeling is built on by the judgement of people on the situation of becoming a victim, in this case by natural hazards, themselves. This judgement can be influenced by experiences of being a victim in the past or someone out of their social life, but also because of coverage from the media.
This subjective unsafe feeling has a strong affective component. The threat of supposed danger is bringing fear. This threat can be actual fear, this is for example when somebody is pointed on by a gun. The other threat can be anticipated fear or anxiety, when there is no direct threat. This is for example when people are scared to walk alone in the dark. There might be actual danger, but on the other hand there is a big chance there is no actual danger. This subjective safeness has a couple of outcomes. It can cause more stress and depressions and more factual points. Summarized outcomes of this subjective safeness can lead to a lower quality of life and the reactions in behaviour can lead to a vicious circle and have an even bigger influence on the quality of life (De Meijs, 2010). Media has a big influence on the subjective safeness, the more sensational journalists talk about an incident the more fearful people become (Boers, 2008). The other aspect of safeness is objective safeness. When people talk about objective safeness it is about the amount of incidents that occur. It is the factual chance that something happens, this level is measured by the amount and the level of the incidents. Statistics and registrations of incidents give a good measurement of the objective safeness. Important to mention is, that scientists and layman most of the time have a different look on danger. This is caused by the fact that scientists know what the objective facts are, and layman mostly subjective facts (De Meijs, 2010). The lack of public awareness, and thus the attitudinal/motivational vulnerability came forward during the interviews with the residents of the Code River Area. When we asked about the dangers of the lahars, they started laughing a little bit. They see it as an event they have to deal with ones in while (Fitri Aminah, personal communication, March 23, 2017). The residents of the slum areas in Yogyakarta, which are mostly on river banks, do not perceive floods/ lahars as too dangerous to stay settled on these spots such as the Code River Area. This attitude is there, because those possible destructive floods/ lahars do not occur frequently (Kumorotomo et al., 1995). People that live in this area live in a more day to day attitude, which affects their perception of risk negatively when it comes to lahars (Dr. Rini Rachmawati, personal communication, April 3, 2017). They have this attitude even though experts have told the residents that they live in a unsafe area. On the other side they have an Early Warning System, that is basically a buzzer that goes off whenever a lahar occurs (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

Political vulnerability

Political vulnerability describes the vulnerability that is caused by the fact that people have limited access to political power and representation. The community leaders of the kampungs told us that there is a possibility for the community to express their wishes. Every kampung is allowed to send one deputy to talk about plans for the kampungs. Unfortunately the residents were not prepared to do this, because residents of the kampung are more concerned about their everyday life (Sugeng Purwanto, personal communication, March 30, 2017).

Physical vulnerability

Physical vulnerability concerns the vulnerability on the physical part. The physical state of the buildings in the area as well as the physical state of the people in the area. The physical state of the buildings has already been argued in the part of social vulnerability. The physical state of the people in the Code River Area is worse than other residents of Yogyakarta. This has a couple of reasons: first, only 15% of the residents of the slum areas, also Code River Area, in Yogyakarta have access to clean water, whereas the majority drinks ground water which is not monitored. Second, 2% of the residents use water from the river for domestic purposes. This is used for domestic purposes, but also as a garbage disposal and a public toilet (Kumorotomo, et al., 1995). The usage of the river as a public toilet has reduced since a private company (CSR) invested in sanitary facilities (Rini Rachmawati, personal communication, April 3, 2017). The physical vulnerability in the Code River Area is mostly caused by the area itself. The building stock is vulnerable for natural
hazards since the houses that are built by themselves, are mostly build with a lack of knowledge.
Other parts of the city are less vulnerable for a weak building stock, since they do not have to deal as
much with natural hazards such as a lahar. Also, in this area the sanitary facilities and clean drinking
water are available in a smaller proportion than in other parts in the city, which makes the residents
physically more vulnerable. Those physical vulnerabilities occur in a higher proportion in the Code
River Area and its residents than in other parts and other residents of Yogyakarta, which makes the
area both on the spatial- and the social aspect less just (Dr. Rini Rachmawati, personal
communication, April 3, 2017).

Bringing these subconcepts in relation to each other

These different subconcepts of vulnerability can be caught under the big concept of vulnerability, but
those different subconcepts can also be brought in relation with each other and they also influence
each other, such as economic vulnerability and social vulnerability. The lack of resources in the area
cause that there are no possibilities for the residents to move and live in a safer place somewhere
else. Even if it is economically possible they will lose all the social relations, which are very valuable
for the residents, they have build up through the years (Sugeng, personal communication, March 23,
2017). The loss of social relations is related to the social vulnerability of the residents. The low level
of education and income cause that the people in the kampung are of the same economic, and
mostly also social, class. The low level of education in its behalf contributes to the kampungs
educational vulnerability, since the average level of education is low (Dr. Estuning Tyas Wulan Mei,
personal communication, April 3, 2017). This low level of income and education causes that people
live with a more day to day attitude (Dr. Rini Rachmawati, personal communication, April 3, 2017).
This attitudinal and motivational vulnerability makes them have a low public awareness and a low
preparedness to help with processes in improving the Kampung. An example of this is the
preparedness to be a deputy for the Kampung to talk about plans related to urban planning about
the Kampung. Since residents live on a day to day basis, they are not able, or do not want to
participate in making plans for the future, which results in a higher political vulnerability (Sugeng,

4.2.5 Resilience

Resilience is defined by the United Nations as “the ability to absorb disturbances while retaining the
same basic structure and ways of functioning, the capacity for self-organization, and the capacity to
adapt to stress and change” (Wheeler & Beatley, 2014). Resilience is a step further than vulnerability.
Where vulnerability of an area and/or people describes the things that makes the area or people
easier or less easy to be affected. Whereas resilience is more pointed on actually coping with
situations caused by these vulnerabilities (Barry, 2012).

The Code River Area consists of different Kampungs, which are basically small groups of settlements
together in a system of small alleys. Appropriate for the particular case of the Code River Area, would
be the concept neighbourhood resilience. Neighbourhood resilience is defined as “the existence,
development and engagement of local resources by community members to thrive in an
environment characterised by change, uncertainty, unpredictability, and surprise” (p. 6,7).
Neighbourhood resilience can be measured by the level of unemployment, income levels and
deprivation within a neighbourhood. A neighbourhood is resilient when the area is showing better
outcomes than expected, seen the intensity of stress and pressure that the neighbourhood is
exposed to. If a neighbourhood is resilient can be determined by the following factors, that are
followed by the analysation of the particular factor on the case:
Economic

The economic resources available to a community for the welfare of its population, including individually and collectively held financial resources available for investment in business development and civic and social enterprise (Platts-Fowler & Robinson, 2013, p. 6&7). Most of the residents of the Code River Area are poor and low-educated and the Code River Area used to be a so-called economic black area (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). The low economic standard of the residents of the Code River Area makes the economic resilience of the area low.

Social

The ability and willingness of community members to get along together, support one another, and participate in actions directed at community objectives. For the most part, social support captures helping behaviours within family and friendship networks, but it also encompasses members’ experiences and perceptions of the wider community, including interpersonal trust, sense of belonging, and tolerance of diversity. Research has found that these perceptions of community are often related to other neighbourhood phenomena, such as levels of crime, deprivation, satisfaction with the Council and local services, and whether members feel their local area is a good place to live. Another dimension of social capital is the presence of organisational structures within a community, including small groups such as committees, churches, and youth groups. These organisational structures represent the ways in which members of the community come together to socialise and address concerns and problems. The existence of organisational structures, the level at which these organisations function, and the linkages between organisations are critical to community empowerment (Platts-Fowler & Robinson, 2013, p. 6&7). According to Tri (personal communication, March 30, 2017), there is a high social cohesion which means that the people are willing to get along together and support each other. Per kampung there is a Community leader appointed, which can be seen as a way of collaboration between the residents and it could lead to actions for community objectives. Though still the people are mostly focussed on their everyday life, which makes it hard to do actions for community objectives, as can be seen in the willingness of residents to be the deputy in the governmental planning system (Sugeng Purwanto, personal communication, March 30, 2017). The social resilience of the neighbourhood is intermediate, since the social contacts between people are strong, but the focus on overcoming problems on a social basis lies still in the short-term.

Cultural

The ways in which community members ‘know’ the world, their values and their assumptions about how things work, including rules relating to power and influence. Members’ shared understandings of reality contribute to a sense of place and connectedness that in turn affect resilience (Platts-Fowler & Robinson, 2013, p. 6&7). Since it are mostly people from the same class in society (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017), which makes it more likely that they have the same view on how things work. The high social cohesion in the kampungs even makes this stronger (Tri, personal communication, March 30, 2017). The high connectedness between people in a cultural way in the neighbourhood can lead to a higher level of resilience of the neighbourhood.

Human

Individuals’ innate or acquired attributes, whether latent or manifest, such as labour force activity, training, skills and knowledge, physical health and mental well-being. These human resources will influence and, perhaps, enhance the capacity of individuals to contribute to community resilience (Platts-Fowler, 2013, p. 6&7). Unfortunately, as earlier mentioned, most of the residents of the Code
River Area are poor and low-educated (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). Their skills, knowledge, physical health are not very high, partly because of this reason, which makes that the human resilience of the Code River Area will be low.

**Political**

Community members’ ability to access resources, power, and influence decisions that affect the community. It reflects members’ capacity to express themselves and to participate as agents in their own community (Platts-Fowler & Robinson, 2013, p. 6&7). On the political side the ability of the kampungs to reach high resilience is also very difficult. Reason for this is, that it is hard to access resources. It is very hard to influence decisions of the government. As earlier mentioned every kampung is allowed to send one deputy, but the residents are not prepared to do this since they are more focussed on everyday life (Sugeng Purwanto, personal communication, March 30, 2017).

**Natural**

These are resources and ecosystem services from the natural world (Platts-Fowler & Robinson, 2013, p. 6&7). On the natural side the Code River Area has a very low resilience. The area has a lack of resources, a polluted river and is partly because of that, besides the lahars, a dangerous area to live in. (Dr. Estuning Wulan Tyas Mei, April 3, 2017).

**Built**

These are a community’s physical assets and built infrastructure, for example homes, schools, roads, office buildings, factories, community buildings and public spaces (Platts-Fowler & Robinson, 2013, p. 6&7). The built environment of the Code River Area can be described as small settlements/houses that are built in a high density and remarked by small alleys between the settlements. Those houses were mostly built by themselves without enough knowledge, which makes them more vulnerable for natural hazards (Dr. Rini Rachmawati, personal communication, April 3, 2017). The low quality of the housing stock makes that the resilience of the built environment is low. Tri mentioned that most kampungs only have one or two entrances (Tri, personal communication, March 30, 2017). The lack of entrances can also lower the resilience that is declared by the built environment.

**Information and communication**

Good communication is essential for community competence and resilience in emergency situations, information and communication are vital. People need accurate information about the presenting danger and behavioural options, and they need it quickly. When facing longer-term stress, information and communication will be similarly important. As well as being correct, and appropriately transmitted, it is important that the source of the information is trusted. Some communities are more likely to trust local sources of information than unfamiliar distant ones (Platts-Fowler & Robinson, 2013, p. 6,7). As earlier mentioned the community in the kampungs has a high social cohesion (Tri, personal communication, March 30, 2017), which causes that there is a lot of communication between the residents of the Code River Area. Also, there is an Early Warning System, in the form of a buzzer that warns the residents when a lahar occurs. The residents are also informed about the dangers of the lahars by experts (Dr. Estuning Wulan Tyas Mei, April 3, 2017). The factor of information and communication on resilience scores high, however questions can be asked if the residents accept and use, or are able to use, the information that the experts gave them. Summarized the neighbourhood resilience of the Code River Area scores could get a lot better when the concept is measured by the factors of Platts-Fowler & Robinson (2013).
Bringing these different subconcepts in relation

The different subconcepts of neighbourhood resilience are related to each other. As you can see in the parts named ‘social’ and ‘cultural’ there is a high social cohesion and people are willing to help each other out (Tri, personal communication, March 30, 2017). The high connectedness between residents of the Code River Area makes the resilience of the area strengthen. However, the residents do not have a lot to offer. It is from origin a very poor, even called black area, with a low level of education (Dr. Estuning Wulan Tyas Mei, April 3, 2017). This low level of economic and human capital makes it harder to improve the area by themselves. This low economic level causes that a lot of people that live in the area live on a day to day basis, which means they are not very interested in projects for the future. This can be seen in the low willingness, or ableness, to be a deputy for the kampung and think about improvements together with the government (Sugeng Purwanto, personal communication, March 28, 2017). This reduces the resilience of the Kampungs, and as an extra negative factor, the residents can not really count on resources out of their natural environment. Though community leader Sugeng Purwanto (personal communication, March 28, 2017) named a possibility to make use of the natural environment. According to the community leader the kampung uses the sediment that is brought in by the lahar and sells it. They use the sediment and make it their economic advantage, which makes the Kampung more resilient on the economic basis. An economic improvement could cause an upward circle of cumulisation, such as for example better possibilities to get educated, which on their behalf could improve the economic situation again. However, After the last lahar in 2010 residents got a fee from the government and even volunteers from the Netherlands helped to restore the area, which makes them far away from independent (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). This shows that the situation of the kampungs at the moment shows that the kampungs are far from resilient to the occurrence of a lahar. This is contributed by the definition of Platts-Fowler & Robinson (2013) about community resilience which they define as: “the ability to respond and adapt positively to change, significant risk, or adversity” (p.8).

4.2.6 Spatial- and Social Justice linked to planning

To be able to relate the concepts of Spatial- and Social justice to planning, first must be declared what the role of urban planning is. Fainstein contributes to theory of what the role of urban planning should be in her book about the Just City. In this book she elaborates on her vision about cities, about how cities are dominated by economic growth and the politics of planning. When it comes to urban policies, Fainstein believes that these policies must be devoted to ‘justice for all residents, especially low-income people’ (Fainstein, 2010). In her book ‘Planning Theory and the City’ Fainstein argues, that planning theory should provide answers to the following questions: (1) ’Under what conditions can conscious human activity produce a better city for all citizens? (2): How do we explain and evaluate the typical outcomes of planning as it has existed so far?’ (Fainstein, 2005). Out of question one, we can make up, that planning theories should be for all citizens and not just for the rich or the poor. Idem this vision can be seen in other parts of the book. For example, in the book, Fainstein devides justice in three different concepts: equity, democracy and diversity. Fainstein states that important for ‘equity’ is, that planning projects promote equality and try to improve the lives of low-income residents (Fainstein, 2005).

Spatial- and social justice related to vulnerability

The justice Fainstein (2005) talks about in her book applies on spatial- as well as social justice. On its behalf spatial- and social justice are strongly related to the concept of vulnerability. The amount of vulnerability in an area or in a social group compared to other groups is a possible way of measuring the spatial justice or injustice in a geographical entity (Soja, 2009) and social justice or injustice between the social groups in a society (Harvey, 2010).
Linked to the situation in the Code river area

Out of the analysis of the vulnerability in the Code River Area can be derived that the Code River Area is quite vulnerable on multiple aspects of vulnerability, compared to other social groups and other areas. This higher vulnerability of the area and its residents makes it a place that spatial- as well as social suffers of injustice. They for example have a low level of income and education. Also, they live in an area that is more likely to be affected by a lahar. The combination of those two examples makes it a highly vulnerable and social-, as well as spatial-, unjust place. What emerges from the prior examples is, that social justice is related to urban planning. This is contributed by David Harvey (2010) who argues that: “social justice has some relevance for the application of geographical principles to urban and regional planning”.

The relation to planning

Earlier was already mentioned that such areas of injustice can be affected by cumulative causation, which makes the area get into a downward spiral, which makes it even more neglected compared to other areas. This contributes to social- and spatial injustice of which the area and its residents suffer compared to other social groups. To come out of this negative cumulative causation multiple options were named. One option was related to methods of change, organized by the government. The other option was to organize change ‘spontaneous’ by private companies/investors or the community itself (Pijpers, 2014). The partition in this options between the public sector and the private sector can be related to different kinds of planning approaches. Urban planning in developing countries in the contemporary world is focussed on two urban theories, the Chicago School of Urban sociology and the Los Angeles School of Urban Geography. The Chicago School of Urban sociology and the Los Angeles School of Urban Geography are both modernist views on planning (Rukmana, 2010). The same goes for Indonesia, where the modernist planning approach, also known as top-down planning, is currently dominant (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

4.2.7 Modernist planning approach vs postmodernist planning approach

Modernist planning in the Code River Area

A Modernist, or top-down, planning approach is a planning approach in which planning is done by experts without any interference of the residents. The modernist paradigm domain of planning “operates in the public interest and planners seek to identify that interest within community. Planners attempt to present a public image of neutrality and planning policies based on positivist science. The notion of public interest comes from a frame of reference in liberal political theory in which disinterested experts objectively and rationally analyse a problem and arrive at a solution that is in the public interest. It assumed the ability of a certain chosen, well-educated group to stand outside social processes and decide what is best for everyone else” (Sandercock, 1998). A good example of the application of the modernist planning approach in the Code River Area is the Rumah Susun. The Rumah Susun is a complex of apartments, built by the government, in the Code River Area. The Rumah Susun is meant to provide cheap and safer housing for the less fortunate people. The Rumah Susun are safer, since it are flats that are higher than normal settlements. Also the Rumah Susun are built with more knowledge about constructions, which makes them of better quality to cope with for example a lahar (Dr. Rini Rachmawati & Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). “It is like a program that the government want to help the low-income people with, so they can afford a house“. The resident of the Code River Area, and especially the older residents, do not want to live in the Rumah Susun, because living in apartments does not fit in the culture of Indonesian people. Younger people are on the other side starting to accept and live in the Rumah Susun (Dr. Estuning Tyas Wulan Mei, personal communication, April 3,
2017). Another disadvantage of living in a Rumah Susun, is that you rent it, which means you do not own the land. This is particularly a problem in Indonesia, according to Dr. Djaka Marwasta (personal communication, March 27, 2017) the situation is that “if you want to make a business you need money and need to bring the certificate of the land and then the bank will give you money and if you do not have the certificate the bank will not give you credit. With vertical housing you do not have a certificate so you cannot access credit from the bank”. This makes it even harder for residents to get in a better economic position, since they cannot invest in being an entrepreneur (Dr. Djaka Marwasta, personal communication, March 27, 2017). Other arguments against the Rumah Susun were that the apartments are too small (Sri Wijilestari, personal communication, March 30, 2017) and that people are physically not able to live in the Rumah Susun (Sri Mulyani, personal communication, March 30, 2017). The modernist planning approach is not only bad, according to Dr. Estuning Tyas Wulan Mei (personal communication, April 3, 2017) “I do not want to say one way of planning is better than the other one, because each of them have positive sides. Top-down for example: because Indonesia is quite big and if everything should be in the participatory planning this is hard to manage”.

**Postmodernist planning in the Code River Area**

Methods of change that are done by the private sector or communities itself are more related to the postmodernist approach of planning. Postmodernism is more focussed on community-based planning. Residents are able to interfere more in the process and dictate the agenda of the local government. Participation is key for this kind of planning and can lead to better public policy. It might be that the residents give more selfish input, but this gives the government more information so they can better fulfil the needs of the residents (Verba, 1972). An example of postmodernist planning are the sanitary facilities that were built by the CSR, together with the residents (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

**Main difference between modernist- and postmodernist planning**

The difference between modernist planning approach and the postmodernist planning approach is mostly that in postmodernist approach residents can interfere and talk with the experts, whereas at the modernist approach residents are locked out from decision-making by the experts (Verba, 1972). Both of the approach have their advantages against each other. Top-down planning for example is better organised. On the other hand bottom-up planning, also known as postmodernist planning, is looking more towards trends in a certain region, which makes the residents more satisfied with interventions in their neighbourhood. (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017).

**Possible ways of improving**

Out of the example about the Rumah Susun can be derived that the modernist Top-down planning not suits in every situation in the Code River Area. In every city/region there are planning centres, who provide the urban planning. The implementation of these plans unfortunately often fails. Problems with implementing those plans are the lack of information that is given to the community/residents in the area, but also the lack of details in the plans. Another problem is the low degree of participation of the community/residents of the area. A good option to involve residents, is by educating them the dangers of lahars, and how to mitigate the lahars. The education can lead to a better understanding of lahars and can improve the awareness of the residents (Dr. Rini Rachmawati, personal communication, April 3, 2017). By letting experts educate them about lahars it is possible to change the view of residents towards lahars. Important for changing this view is the different look of experts/scientist on dangers compared to layman, such as the residents. The different look is caused
by the way that scientist are more looking at facts and layman mostly know the subjective facts out of their experience (De Meij, 2010).

**Which approach of planning should be used?**

The best way to provide urban planning with the goal to provide a safer environment against lahars in the Code River Area, is to combine the Postmodernist- and the modernist approach of planning and let experts work together with the locals. Since people in the Code River Area live on a more day to day basis, they are not able to look into the future as much, which makes them less capable of providing urban planning for the future. On the other side experts in planning have the knowledge, but do not know what the people in the area want. A combination between top-down and bottom-up planning is then most likely to be successful (Dr. Djaka Marwasta, personal communication, March 27, 2017). This is contributed by Dr. Estuning Tyas Wulan Mei who claims a dialogue between people of the community, experts, NGO’s, and politics would be the best way to provide solutions for the Code River Area (Dr. Estuning Tyas Wulan Mei, personal communication, April 3, 2017). One of the residents we interviewed also mentioned that a coalition between experts and locals is important. She thinks experts should educate the residents and the locals should put it into practice. The only problem is that people live in a day to day basis, which makes it uncertain that residents will use the knowledge they gained with the education (Sri Wijilestari, personal communication, March 30, 2017). Other residents are less explorative, but state that they think it is a good idea to create planning together with the residents and the experts. As a reason they give the misjudgement of the government to build the Rumah Susun (Tri, personal communication, March 30, 2017).
5.0 Conclusion

In the analysis above the different aspects and concepts of the research are explained in put into context with the Code River Area. The knowledge that already existed about the different concepts is combined with the knowledge gained by residents of the Code River Area and experts on the topics of geography and urban planning. Out of these concepts and the analysis of these concepts on the particular case, an answer to the main question can be derived. After this a discussion will follow and at last recommendations will be given.

Main question

The main question of this research is:

*How can a shift in the modernist planning approach towards a more Postmodernist planning help reduce the vulnerability, and increase the resilience, of communities in the Code river area?*

What can be derived from the analysis is, that the Code River Area is an area that is located in the danger zone in case of the occurrence of a lahar. On top of that the area is remarked by low-educated degrees and a low level of income. The residents work mostly in the (informal) tourist sector in Malioboro street in the centre of Yogyakarta, which is near the Code River Area. The area is divided by a river into different *‘kampungs’*. The river makes that in case of the occurrence of a lahar, it will most likely come through the river beds, and thus will the lahar partly come through the Code River. This may cause that a natural hazard transforms into a natural disaster. A natural hazard transforms into a natural disaster when the natural hazards has a major impact on society and the physical environment.

The Code River Area is seriously affected after the occurrence of a lahar, and for this area a lahar is thus a natural disaster. In case of a lahar, the Code River area will suffer more from it, then other parts of Yogyakarta. This makes the area and the residents suffer more from the natural hazard, which makes it an area that is subject to Spatial- and social injustice. Due to the low level of education and the mostly low incomes the residents have, it is hard to cope with such natural hazards/disasters. The reason that it is hard for residents of the Code River Area to cope with a lahar is partly because of their high rate of vulnerability. The Code River Area is vulnerable in multiple aspects: economic, social, cultural, attitudinal, educational, political and physical. Due to a lack of economic resources, it is hard to invest in safety for the residents of the Code River Area. They are not able to buy a house in a safer zone, and even if they could they would lose their job in the city centre, because their mobility is not high enough to be able to transfer from their new home to the city centre.

The neighbourhood is very vulnerable to stress and not resilient against a lahar, since a lot of the Code River Area gets destructed and has to be build up again, with help of the government and volunteers. Still, the neighbourhood tries to build-up their resilience by selling the sediment that came with the lahar.

Considering the lack of resources to be able to protect themselves from the lahar, the Code River Area needs help from others, such as the government. The urban planning system is created to promote equality between the residents of their territory. It was already mentioned that the Code River Area suffers from spatial- and social injustice compared to other parts of the city in case of a lahar. The urban planning system is made to create and recreate equality and justice to all of their residents. There are different approaches in planning of which two have been elaborated on: the modernist planning approach and the postmodernist planning approach. The modernist approach has as characteristic that there is no involvment of residents, the planning is done by experts.
Postmodernist planning approaches are characterized by the opposite, communities do planning with sometimes help from experts. In Indonesia and thus also in the Code River Area mostly modernist planning is applied, but this is certainly not always a success as can be seen in the case of the Rumah Susun. Though on the other hand it is possible for the Kampungs of the Code River Area to participate in the planning process by sending one deputy of the Kampung to think together with the experts about future plans. The attitude of living on a day to day basis, just to basically survive and live ‘normal’, causes that no one is able or willing to participate as a deputy.

To come to a more suitable planning system experts advice to let residents and experts work together to come to better solutions. Residents are not able and some not willing to move to other areas than the Code River Area, even when experts say it is a totally unsafe environment. Experts can educate residents about possible effects of a lahar and increase by this the awareness of the residents and give them a better opportunity economically. This economic improvement can cause that the residents are able to look more in the future and have less concerns about ‘surviving’ and live on a day to day basis. As a result of this residents will be more prepared and able to participate in the planning process. By educating them also explicitly about the lahars, the residents can also be useful in managing the risks of a lahar and think about possibilities to reduce the amount of destruction a lahar can make. When the destruction of a lahar can be reduced, the vulnerability will reduce and the resilience of the residents of the Code River Area will increase.

5.1 Discussion
This research shows that the approach of planning can be vital in planning problems, such as for example in the Code River Area. In this research a couple of concepts were vital and used: vulnerability, resilience, spatial justice, social justice and modernist- and postmodernist planning approaches. The Code River Area is a highly vulnerable, and less resilient area that suffers from the effects of lahars. Due to the high building density and the low quality of houses, the lahar is even more destructive. Residents are mostly unable or refusing to leave the area. The government tried to build safer houses in the form of flats called the Rumah Susun, but they are not popular amongst residents. The reasons for the lack of popularity are economically, cultural and comfort. The government could have avoided this by talking to the local residents about their plans. This brings us to a different planning approach where the community/residents have more power in interfering in the planning process.

According to the interviews with residents of the Code River Area and the experts this would be a better way to reduce the risks of a lahar. Education is an important factor in creating awareness and as a result of that creating more knowledge and more cooperation of the residents when it comes to reducing the risks of lahars. By creating more understanding about the dangers, people will be more willing to help in the process of reducing these dangers. Without taking the residents with in the process, it is way harder to gain their support for a plan.

There are certain limitations to this research: since it was only a small research project, the amount of respondents are quite low. Another limitation to the research is, that I was not able to talk to the government since my VISA did not allow me to. On the other hand I interviewed a lot of experts in geography and urban planning. Dr. Estuning Tyas Wulan did her masters about geo-referencing, urban planning, and risk management, which is highly relevant for this research. Dr. Rini Rachmawati already participated in a research about the same area, so she had a lot of knowledge about the area.

What I hoped to achieve with this research was to gain more scientific insight in planning approaches in areas that suffer from natural hazards such as lahars. In practice this could possibly help, not only
the Code River Area, but all areas that suffer from natural disasters. A next research about the topic, could include the government and could include areas that are already in a process of mitigating the dangers of natural hazards by using a combination of the modernist- and postmodernist planning approach. These studies can help to test if it actually works out the way it is supposed to be or that it creates new challenges.

5.2 Recommendations
The goal of this research was to gain insight in using the appropriate planning system in order to protect areas where residents have a low income and a low level of education. As case I used the Code River Area, and in my research the search for an appropriate way of planning was successful. Still, the research got its flaws, but by talking to residents and experts about the topic it became more and more clear that participation of the residents in finding solutions for such extreme events is vital.

My recommendation would be to increase the awareness of the residents by educating them and then go further with integrating residents in the process. Since, these people are not likely to go away from this area you can better find a solution for the lahar with them. The area has a high building density and to reduce the destruction of a lahar the river should get more capacity. The gaining of this capacity can be done by giving more space to the river or building higher walls. The experts and residents were talking about higher walls. This might be a good protection against a lahar, but to create an even more positive outcome giving more space to the river can be interesting. How can this space be created in such an area with high density of buildings. For example, multifunctional areas can be created. A market place near the water that can be used as a market place as well as a temporary storage when a lahar occurs. Then the community could use this extra sediment that stays in the area, to gain a higher economic advantage by selling more sediment.

Another example to create a more positive outcome is to build a part of the settlements on strongly constructed poles that are strong enough to deal with a lahar and together with that make a boulevard besides and partly on the river. This creation of settlements on poles will make the effects of shocks decrease and could potentially be a future place for tourism. The possible presence of tourism could improve the economic welfare of the residents in the Code river area and make them less vulnerable and more resilient for shocks like a lahar. This could possibly lead to a change from a downward negative (economic) spiral, the Code river area is currently in, into a upward positive (economic) spiral.

By initiating and controlling such ideas in the beginning, and listening and considering to the ideas and opinions of residents besides educating the residents, the residents might be able to initiate and control these kind of projects themselves in the future and thereby reduce their vulnerability and increase their resilience.

5.3 Reflection
This research started with writing a research proposal. I remember that I was struggling with this a lot, since you have to read a lot of literature about not only your subject, but also about doing research itself. Still, I managed to finish my research proposal on time to go to Indonesia.

Two days after our arrival in Jakarta, we arrived in Yogyakarta by train. The days that followed were used to get settled in the city of Yogyakarta. After a few days in Yogyakarta we had our first meeting with the project coordinator in Indonesia. After a brief talk we were divided between supervisors and
were lead to them to have a talk about a research with them. I discussed my research project with my supervisor, Dr. Estuning Tyas Wulan Mei, and we came to the conclusion that a translator was needed for my research project, since the people in the Code river area most of the time were not able to talk English. Since it was a very busy period on the Gadjah Mada University, because of exams, me, Casper and Roelof shared translators, since our research overlapped in a couple of parts. After a few days Casper, Roelof and me got two translators appointed by our supervisors who would help us with our further research. We planned a meeting on the university with them a couple of days later. After some explanation and discussion of our interview guides we decided to go to the site which we wanted to investigate for our research. This site was a place located just next to the Code river area with small houses built close to each other. At this day we managed to get three interviews with local residents, which was a lot for the amount of time we spend in the area. This fast development in our research occurred mostly because we met a local resident almost instantly after arriving in the neighbourhood. This local resident called himself ‘Tri’ and studied for tourism, he wanted to help us with our interviews to improve his own English by talking English with us. The neighbourhood of Tri is a small neighbourhood, also known as artist kampung, where everybody knows each other. Because of that, it was really easy to get into contact via Tri. Tri also brought us to the community leader, who also did an interview with us. After a couple of interviews we returned to our accommodation and reflected the day. We decided to change our interview guide a little bit to make it better understandable for the locals and we made a different one for interviewing the experts. A couple of days later we went to the same neighbourhood to pick up Tri. Together with Tri we decided to go to the other side of the river to visit another Neighbourhood in the Code river area. Our first interview over there was with the community leader of this part of the community. After the interview we did some more interviews with local residents, which made it another successful day when it comes to the amount of interviews we managed to do. What I still missed for my research was a view of experts on my subject and actually Roelof and Casper were struggling with the same thing. We decided to ask our supervisors, also experts when it comes to geography and urban planning, to have an interview with us. A couple of days later we had an interview with the supervisor of Roelof, Dr. Djaka Marwasta. This was a very enlightening interview, since this was the first time I got an expert view on my subject. A couple of days later we also got the interview with Casper’s supervisor Dr. Rini Rachmawati and Dr. Estuning Tyas Wulan Mei, which was also very informative and enlightening when it comes to my research. My research also has a certain limitation. In my research I was not able to interview experts of the government about the subjects. The reason for this is, that due to our VISA we were not allowed to interview these officials.

After all the interviews and the site visits to the research area, it was time to write the thesis. In the beginning I was struggling with how to frame my research, but after some discussion with my supervisor, I managed to find a proper way to frame my research. The process of analysing began and I came to understand that some of my concepts were not sufficiently explained, which cost me a lot of time in my process of analysing. For the rest analysing went quite good, without any big obstacles. I had another meeting with my supervisor, which declared the things that I was still uncertain about. I got feedback on my conceptual model, where I was struggling with a lot, and I managed to find a way to put the concepts logically in the conceptual model. After the process of analysing I wrote a conclusion and recommendation, which was more kind of a summary of what I had done already.
6.0 References

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7.0 Appendix

7.1 Interview guides

**Interviewguide residents**

First of all many thanks for participating in this interview. We are students from the Radboud University in Nijmegen, the Netherlands. We are currently doing different researches about the Code area which are related to Urban Renewal, Environmental justice and dualism in Spatial Planning. Before we start this interview, we would like to ask if it is okay that we record this interview (If the interview is in English). This way, it will be easier for us to analyse this interview and use it in our research. Everything you will say will be handled with care and will stay inside our research.

1. **Background information about the interview participant**
   
   a. What is your age?
   b. What is your profession? And in which area do you work?
   c. What is your origin?
   d. What for level of education do you have?
   e. What is your average monthly income? (We are not sure if we can ask this. It might be rude, so that is up to your judgement.)
   f. In which area of Yogyakarta do you live?
   g. Why do you live here? (What was the reason that you chose to live here?)
   h. If you had the opportunity to live somewhere else would you do that, and so yes where would you live?
   i. Who is the owner of the building your live in?

2. **General**
   
   a. What do you know about the dangerous caused by the Merapi in this area?
   b. Did you ever experienced lahar/flood or other natural disasters?
   c. How do you perceive the risk of lahar/flood?
   d. Do you feel like you live in a unsafe environment?
   e. Do you think that there can be done more about preventing your neighbourhood from those disasters?
   f. What would you like to change in the area to decrease the amount of destruction caused by those disasters?
   g. Did you experienced more floods or lahars last year’s then before?

3. **Urban Renewal**

   a. Would you like it to live in a Rumah Sunsun, and why would you like it or why not?
   b. Do you see opportunities for ecotourism in this area, and why do you see them? And would you like to participate in ecotourism, and why do you do so?
   c. How do you think that the quality of life in the area could be improved by Urban Renwal?
   d. Would you like to participate in making a urban renewal strategy for this area? What kind of urban development would you like to see in this area?

4. **Environmental Justice**

   a. Did many people moved in the area last ten years, and how do you see this?

5. **Dualism in Spatial Planning**
a. Do you think if you get more power in decision-making as a normal citizen, the awareness of the risks of the Merapi will get better?

b. Do you think that more awareness of outcomes can lead to less vulnerability of the exposure of lahars?

c. Do you think that a coalition between experts and local people could lead to better solutions against the outcomes of eruptions of the Merapi? (Do you maybe have any examples?)

**Interviewguide experts**

First of all many thanks for participating in this interview. We are students from the Radboud University in Nijmegen, the Netherlands. We are currently doing different researches about the Code area which are related to Urban Renewal, Environmental justice and dualism in Spatial Planning. Before we start this interview, we would like to ask if it is okay that we record this interview (If the interview is in English). This way, it will be easier for us to analyse this interview and use it in our research. Everything you will say will be handled with care and will stay inside our research.

6. **Background information about the interview participant**

   - What is your profession in this university?
   - What for level of education do you have?
   - In which area of Yogyakarta do you live?
   - Why do you live here? (What was the reason that you chose to live here?)

7. **General**

   - What do you know about the dangerous caused by the Merapi in this area?
     o Did you ever experienced lahar/flood or other natural disasters?
     o How do you perceive the risk of lahar/flood?
     o Do you feel like you live in a unsafe environment? If the respondent lives in the code river area
     o Do you think that there can be done more about preventing your neighbourhood from those disasters?
     o What would you like to change in the area to decrease the amount of destruction caused by those disasters?
     o Did you experienced more floods or lahars last year’s then before?

8. **Urban Renewal**

   - How is the perception of people in Yogyakarta about the Rumah Sunsun?
   - Does the government want to build more Rumah Sunsun in the future, and why do they do so?
   - Do you see opportunities for ecotourism in this area, and why do you see them? And do you think residents of the code area like to participate in ecotourism, and why do they do so?
   - How do you think that the quality of life in the area could be improved by Urban Renwval?
   - Are people willing to participate in making a urban renewal strategy for this area? What kind of urban development would they like to see in this area?

9. **Environmental Justice**

   - Did many people moved in the area last ten years, and how do you see this?
   - Do you think the people are capable of building-up their livelihoods by themselves?
- Is there any formal or informal cooperation between the residents to build-up their livelihoods again?
- Do the people get any form of public support, so they are better able to build up their livelihoods again?
- Do you think that potential destruction of lahars restraints the development of the residents in an economical educative way?
- Do you think that climate change has any significant effect on the frequency or power of lahars?

10. Dualism in Spatial Planning
- Do residents participate in making planning documents?
- What do you think about the top-down planning that is used in Indonesia?
- Do you think if the residents of Code river area get more power decision-making, the awareness towards the risks of the Merapi will get better?
- Do you think that more awareness of outcomes can lead to less vulnerability of the exposure of lahars?
- Do you think that a coalition between experts and local people could lead to better solutions against the outcomes of eruptions of the Merapi? (Do you maybe have any examples?)
- What do you think about implication of bottom-up planning in Indonesia?

7.2 Coding

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