Resilience after Drought

Government and Civil Society in São Paulo after 2014-2015

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Abstract

São Paulo was severely affected by the drought in 2014-2015. All the inhabitants of the city were affected by the drought but some suffered more from the consequences than others. Therefore, it seems to be important that the city and its inhabitants take the opportunity to point out, target and decrease the exposed vulnerabilities in order to protect themselves against future natural events. In order to increase this level of resilience, both government and civil society actors need to be able to mobilize and organize themselves in the case of a next drought. Resilience, in this thesis and the research it draws on, is seen as a process defined by state-society relationships. Meaning that the relationship between government and civil society are continuously influencing, adapting to and changing each other in a particular socio-ecological context. This thesis argues that how and to what extent society is able to anticipate, reduce the impact of, cope with, and recover from the effects of a natural hazard is largely determined by the relationships with the government. Hence the reason that resilience is seen as a political process. The argument made is that social actors need to be included in political decision-making processes to influence policies made on a government level. The value of including the knowledge of a local socio-ecological context in setting-up and implementing policies can contribute to strengthening resilience in the short and long-term. Besides this key point, this thesis also points out the lack of inclusion of civil society actors in the political decision-making processes in the case study of São Paulo, Brazil. Therefore, the importance of the actions taken by social actors itself to increase the level of resilience in their local socio-ecological context is also considered a key point.

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1. Introduction

"*As southeast Brazil grapples with its worst drought in nearly a century, a problem worsened by polluted rivers, deforestation and population growth, the largest reservoir system serving São Paulo is near depletion*", stated the New York Times (Romero, 2015). From the beginning of 2014 until the end of 2015, São Paulo experienced one of its most severe droughts since centuries. All the inhabitants of the city were affected by the drought but some suffered more from the consequences than others. Therefore, it seems to be important that the city and its inhabitants take the opportunity to point out, target and decrease the exposed vulnerabilities in order to protect themselves against future natural events. In order to increase this level of resilience, both government and civil society actors need to be able to mobilize and organize themselves in the case of a next drought.

Some environmental scientists have argued, from a meteorological point of view, that the occurrence of the drought was intensified by processes of deforestation in forests such as the Amazon (Nazareno and Laurance, 2015). Changes in the total amount of forest can influence rainfall variability as well as temperatures. A decrease in rainfall and an increase in temperature will, therefore, influence water availability (Nobre, Marengo, Seluchi, Cuartas and Alves, 2016). In São Paulo, this resulted in water reservoir systems that were reaching their lowest levels. The Cantareira System, which is responsible for providing water for around 8.8 million people, reached its lowest level at the beginning of 2015: 5% water was left in total (Dobrovolski and Rattis, 2015). In order to make sure that there was enough water available in São Paulo, the Alto Tietê reservoir system – which is considered as the second largest water system after the Cantareira – was also used (Nobre et al., 2016). Next to this, the Guaraprianga reservoir system and the Billings reservoir system were also used as they are located near São Paulo (World Bank, 2012). Despite the use of several water reservoir systems, the Alto Tietê reservoir system reached an extremely low level of water availability in August 2015.

Even though deforestation, rainfall variability and increasing temperatures did play a role in the occurrence of the drought, the political and social decisions that were made cannot be forgotten. First of all, legal deforestation is accepted and largely regulated by the government of Brazil. Meaning that the state had, to some extent, impact upon the severity of the drought. Secondly, urban water management in São Paulo is inefficient and might even be considered as poor (World Bank, 2012). There is a lack of efficiency and infrastructure with regard to the regulation of water (Braga and Kelman, 2016). Especially in informal urban settlements in São Paulo it is noticed that these neighbourhoods hardly have any water pipes. During droughts, such as the one of 2014-2015, more marginalized people have an extremely low access to water (Cambareri, 2017). Next to this, the citizens of São Paulo that had access to water were restricted to only use the water during the day (BBC, 2014). This had the effect that people became more aware of the severity of the drought and its effects. Thirdly, the national government of Brazil declared a state of emergency in São Paulo in August 2015 – which led to emergency measures (Nazareno and Laurance, 2015; Nobre et al., 2016). This was due to the fact that the Cantareira system and the Alto Tietê system had reached extremely low levels of water availability. The government restricted some of the households even further by denying them access to water for 5 days per week (Escobar, 2015). "*Because of environmental degradation and political cowardice, millions of people in São Paulo are now wondering when the water will run out*", argued Marússia Whately in the New York Times (Romero, 2015).

1.1. Problem Statement

Since São Paulo was severely affected by the drought of 2014-2015, it seems to be important that the city will take measures to protect itself for future natural events by increasing its resilience and decreasing its vulnerability. In order to do so, it is important that both government levels and departments and civil society will be mobilized. Both actors can influence political decision-making processes with regard to social and environmental topics such as deforestation, pollution and urban expansion. Also, both actors can come up with methods and activities that can help strengthen resilience and decrease vulnerability.

One of the methods to increase São Paulo's resilience took place in 1991. The government implemented a Water Act to ensure water availability in the long-term (Barbosa, Alam and Mushtaq, 2016). The state, the local government and civil society actors influenced the decisions made in the Water Act. Therefore, the level of participation and involvement in the decision-making process was high. This was necessary due to the fact that, within the state of São Paulo, there were different local contexts with their own economic, social and political influences that each demanded a different approach by targeting vulnerabilities and increasing their level of resilience (Barbosa et al., 2016). However, as was shown in practice, the government still played an active role by implementing policies that were made on a national level. Civil society was left far behind and was not included in the decision-making process as training and education about water challenges was not given (Barbosa et al., 2016; Sawyer and Lahsen, 2016). Still, there are civil society organizations that are dealing with the social-environmental contexts in Brazil. However, it is hard for some of them to exercise any legal form of action since they are not legally recognized by the government of Brazil (Sawyer and Lahsen, 2016).

Even though the national government of Brazil is stating that civil society plays an important role in the political decision-making process, this is not seen in practice. This is a problem since civil society and its organizations have a lot of knowledge about the situation in a particular local context. In this way, they can provide important information that can influence policies with regard to water management and which, therefore, can increase the resilience and decrease the vulnerability of the local population of São Paulo. What is the reason that the national government of Brazil is not making any effort in increasing the resilience and decreasing the vulnerability of the local population? And more importantly, to what extent are civil society organizations and non-governmental organizations (NGOs) making an effort to increase resilience and decrease vulnerability? Are they doing so with or without the help of the government, private sector or other forms of networks and partnerships? One can wonder if any changes have been made since the 2014-2015 drought in São Paulo by either the government, civil society or by the local population itself.

1.2. Research Questions

Taking into account the problem statement – which addresses the importance of an increased level of resilience in order to be less vulnerable towards natural hazards – and the later stated objective – to contribute to the scientific and social-political debate on changes in resilience made after the 2014-2015 drought in São Paulo – the following main research question is formulated:

How did the drought of 2014-2015 in São Paulo (Brazil) impact upon changes in resilience after the event?

In order to answer the main research question, sub-questions around governmental and civil society responses are formulated as well:

What were/are the reasons São Paulo's vulnerability that were exposed during the event, and why should the level of resilience be increased?

Which levels of government were/are most important for building resilience, and how did the different levels of government interact to achieve resilience?

How was/is resilience supported and promoted by civil society in São Paulo?

1.3. Justification of the Research

Resilience, in this thesis and the research it draws on, is seen as a process defined by state-society relationships. Meaning that the relationship between government and civil society are continuously influencing, adapting to and changing each other in a particular socio-ecological context. This thesis argues that how and to what extent society is able to anticipate, reduce the impact of, cope with, and recover from the effects of a natural hazard is largely determined by the relationships with the government. Hence the reason that resilience is seen as a political process. The argument made is that social actors need to be included in political decision-making processes to influence policies made on a government level. The value of including the knowledge of a local socio-ecological context in setting-up and implementing policies can contribute to strengthening resilience in the short and long-term. Besides this key point, this thesis also points out the lack of inclusion of civil society actors in the political decision-making processes in the case study of São Paulo, Brazil. Therefore, the importance of the actions taken by social actors itself to increase the level of resilience in their local socio-ecological context is also considered a key point.

In order to look at these arguments, the thesis will start by outlining the conceptual framework consisting of the concepts of resilience and vulnerability. After that, chapter 4 will analyse the historical processes of governing and managing the water in Brazil and São Paulo. It is important to look at whether or not the federal government of Brazil had a plan – established by themselves or with the influence of other government levels or civil society actors – to grant all citizens of São Paulo access to water in case a natural event would occur. It is shown that the state government of São Paulo implemented the National Water Act in 1991 to ensure water availability in the long-term (Barbosa et al., 2016). However, it is also seen that in cases of emergency, the national government could not rely on the Cantareira system to provide all citizens of São Paulo with enough water. This chapter implies that state-society relationships are derived from historical shaped processes. In chapter 5, the inclusion of civil society actors through participatory processes will be analysed. As was stated in the National Water Act is that the state, local governments and the civil society should be included in the decision-making process when policies were made and implemented in local contexts. It is mentioned that, in practice, the implementation of these policies lack. This leads to the argument that social actors need to be included in order to increase the level of resilience.

The thesis continues by analysing the situation at the time of the drought in 2014-2015 in São Paulo. It takes into consideration the social, political and environmental factors that could all contribute to the severity of the drought. It will also point out that this situation can be derived from the state-society relationships derived from historical structures. In chapter 7, the thesis will outline the urban water management processes where it is stated that government and civil society actors can work separately on the level of resilience but that the outcome will be less stronger than when they would have worked together. The example of FAMA and FMA in chapter 8 will show the disconnection between the government and civil society actors and will lay out why it is important that the components of the system need to work together. All chapters build up to the argument that resilience is a political process defined by state-society relationships. These state-society relationships are continuously changing but always present. The thesis will conclude by linking these statements and arguments to the research questions. It will conclude that resilience is an ongoing process and that a fixed outcome will never be achieved.

1.3. Objectives

The objective of this thesis is to contribute to the scientific and social-political debate on changes in resilience in the city of São Paulo after the 2014-2015 drought. The strengthening of resilience can be either done by different governmental levels and departments or by civil society actors – which includes NGOs, social movements and the local population itself. The amount of cooperation between these levels is considered as important to the scope of the project. For instance, when a civil society organization has an activity that can decrease the vulnerability and strengthen the resilience of the marginalized population of São Paulo, funding from the national government would help to exercise this idea.

To prevent a next natural event – which can be a drought, a flood or another hazard – from having such a major impact upon the livelihoods of the population of São Paulo, it is necessary that one looks at the efforts the government, civil society organizations and the local population has made to increase resilience and decrease vulnerability. All three levels are considered as equally important when looking at changes in resilience. However, an extra focus will be given to the governmental levels and the civil society organizations. It is necessary to look at the extent government and civil society organizations have an impact upon resilience and vulnerability. In this way, one can look at what already has been done to increase resilience and decrease vulnerability, what still needs to be done and what other options are possible.

2. Methodology

In order to answer the research question(s) based on the before-mentioned problem statement, the thesis consists of a combination of a literature review and a case study of the causes and consequences of the drought in São Paulo, Brazil. The necessary data was gathered through a qualitative mixed methods approach. Meaning that the literature review was integrated with the fieldwork that was conducted in São Paulo, Brazil. This was done due to the fact that some chapters that will be discussed in this thesis, such as the chapter on participatory governance, would have been logistically difficult to do in-depth research on due to the amount of time I was able to spend in São Paulo and the language barrier.

2.1. São Paulo, Brazil

Since São Paulo (Brazil) was hit by a severe drought in 2014-2015, the city was the place where I conducted my fieldwork. The fieldwork was conducted in São Paulo for a period of almost three months: from the 28th of January, 2018 till the 18th of April, 2018. Several methods were used in order to gather the necessary data: semi-structured interviews, an open-ended questionnaire, participant observations and field notes were conducted – as will be further explained. I reached out to many political actors, political groups, (international) NGOs, social movements, research institutes and academics. These actors were able to give me information about São Paulo, the distribution and access of water, the political construction with regard to water governance and urban water infrastructure in São Paulo and Brazil and the role of civil society. These topics and questions were all discussed in the light of resilience and vulnerability while comparing the situation before/during the drought to the situation afterwards.

For my methods, I used a 'snowball approach'. Meaning that I adapted my ideas as well as the respondents I could interview on the opportunities that appeared during the fieldwork. With regard to the local population, the snowball approach worked perfectly. Allowing me to get into contact with, mostly, people from the same social and economic background living in different (vulnerable) areas of São Paulo. That said, it is not my intention to make a generalization of my results: I did not needed to have a statistically representative sample. Moreover, I needed a variety of perspectives of key political and civil society actors. I did not use the snowball approach for the interviews and open-ended questionnaire with political actors, NGOs, social movements and academics. However, the academics did open another door for me by letting me attend workshops and presentations as well as joining the Fórum Alternativo Mundial da Água (FAMA) and Fórum Mundial da Água (FMA). In the end, my fieldwork consisted of the following methods and activities:

Method	Results
Semi-Structured Interviews	15 interviewees
Open-ended Questionnaire	1 respondent
Workshops and Presentations	- Experiências e Aprendizagens em Cultura de Segurança (USP) - Diálogo: O Futuro das Águas (USP) - Fórum Mundial da Água 2018: Desafios da Gestão Hídrica na Grande São Paulo (Fundação FHC)
Forum	- Fórum Alternativo Mundial da Água (Brasília) - Fórum Mundial da Água (Brasília) – Expo and Fair

Table 1: Interviews, open-ended questionnaire, workshops, presentations and forums done and attended during my fieldwork in São Paulo, Brazil.

2.2. Literature Review

Documents and literature are used in order to write a literature review as well as substantiating findings during the fieldwork with regard to the different research aspects of São Paulo, concerning both the research actors and the research topics. These documents are scientific articles, books, webpages and other forms of written publications that all provide different forms of information from different standpoints. In this way, documents/literature are used to reveal the ongoing debates in São Paulo (and Brazil) as well as to substantiate the findings from the fieldwork.

- *São Paulo's Post-Drought Analysis*. Literature about São Paulo contains information about the social, political and environmental factors that contributed to the severe drought of 2014-2015. Next to this, it also contains information about the water reservoir systems that surround São Paulo and provide its population with clean drinking water.
- *Government departments*. Literature about government departments contains information about the (historical) political construction in Brazil and São Paulo with regard to water governance and urban water management. This includes the different forms of democracy and participatory processes and how this is put into practice considering the importance of civil society and the environment. The focus is laid to known information about policies, methods and activities that are strengthening resilience and reducing vulnerability. The actions done by government departments from before/during the drought and after the drought will be compared. This is done in order to see how and to what extent these actions impacted the level of resilience and vulnerability.
- *Civil society*. Literature about civil society contains information about the role of the local population, social movements and non-governmental organizations (NGOs). It is linked to government departments: what is the reaction of civil society to the actions that are or are not completed by government departments? It also includes known information about methods and activities that are strengthening resilience and reducing vulnerability. The actions done by civil society actors from before/during the drought and after the drought will be compared. This is done in order to see how and to what extent these actions impacted the level of resilience and vulnerability.

Databases and maps are used in order to see to what extent changes occurred. Maps are used to see what parts of São Paulo suffered the most during the drought of 2014-2015, and the databases from the different secretaries of the State of São Paulo are used to see what were the causes behind this. Both the databases and maps are used in combination with other literature in order to substantiate findings from both the literature review and the case study in São Paulo. They were also used as a basis for the semi-structured interview to get a better picture of where the problems occurred.

2.3. Semi-Structured Interviews and Questionnaires

Semi-structured interviews were held in order to gather information about São Paulo. Questions were asked about the living circumstances in São Paulo before/during the drought and after the drought, the availability of water before/during the drought and after the drought, the political construction in Brazil and São Paulo with regard to water governance and urban water management, the (changing) role of civil society before/during the drought and after the drought and the room for improvement. Semi-structured interviews were held with the local population of São Paulo, NGOs,

actors that play an important role in civil society, political actors in both the state and local government, actors that play an important role in the international community and academics. The interviews were transcribed, analysed and used in this thesis in order to substantiate findings and answer the research question(s).

Conducting semi-structured interviews in São Paulo, Brazil

Before traveling to São Paulo and during my time in the city, I contacted multiple social movements, (international) NGOs, projects that were conducted in and around the city of São Paulo, academics, and political parties and actors. In the e-mail that I send, I introduced myself, explained my research, how I found them and how they, in my opinion, could contribute to my research and the thesis. Most of them did not reply (also not after a reminder); some of them replied that they did not had the time or that they thought they were not able to help me; others replied that they wanted to help me and asked when I was available for conducting the interview. Some of the conversations were in English and others in Portuguese. The respondents whom I interviewed and that were part of the 'local population' were found via snowball approach. In the first couple of weeks of my staying in São Paulo, I met some people. With them, I talked about my research, among other things. In turned out that they talked with others about my research. Resulting in some respondents asking me if I had the time to interview them. After that, I sometimes got a text that this respondent found somebody else who could be of help with my research.

Most of the semi-structured interviews were conducted in São Paulo. All of them were in a two hour travel radius from my place of residence. The rest of the interviews were conducted during Fórum Mundial da Água and Fórum Alternativo Mundial da Água in Brasilia. In order to get to the forums, a 16-hour bus trip from São Paulo to Brasilia was taken. All of my interviewees were receptive of doing the interview. Questions about my studies, my research and personal life were asked in some cases before conducting the interview – either out of interest or with regard to the background of the research. Particularly the local population was sometimes reserved before conducting the interview. When they understood that I was objective and that I did not criticized them nor the government, they opened up more and were honestly giving answers.

At the end of every interview, I asked the interviewee if he or she had anything more to add with regard to the research. It could be anything: something that he or she forgot to mention during one of my questions, something that I did not ask or something that was just an idea. Basically, it could be anything. What I found remarkable was that everyone made use of this opportunity to voice their opinion. Some were, indeed, elaborations on questions but others resulted in debates between the interviewee and me about the comparison of Brazil and the Netherlands (e.g.).

Box 1. Conducting Interviews during the Fieldwork in São Paulo, Brazil.

The reason for holding semi-structured interviews is that "*a semi-structured interview is open-ended, but follows a general script and covers a list of topics*" (Bernard, 2011: 156). In contrast with unstructured interviews, I also only had one chance to interview a respondent (Bernard, 2011). Therefore, it was necessary for me to know which topics and questions were important for my research before I conducted an interview. Therefore, I have made a list of topics and questions that covered the research. In practice, this turned out to be very efficient. Some respondents covered all the topics and questions when I explained my research and only asked one question. Other

respondents needed more structure and, therefore, the topics and questions were covered more structurally. Prior to the interview, I always asked if the respondent would feel comfortable if I would record the conversation and took notes.

During my fieldwork, I only needed to work once with a questionnaire. I came across several social movements who were not feeling comfortable with meeting me in person. Therefore, I made an **open-ended questionnaire** of the list of topics and questions that covered my research. In this open-ended questionnaire, I was able to give it the same 'structure' as my semi-structured interviews. Meaning that there were topics and questions covered regarding my research but that there was also space left for their own interpretation of the topic and/or question and that there was room for extra information that they wanted to share.

2.4. Participant Observations

Participant observations and field notes were of general importance to look at the everyday lives of the local population of São Paulo. It includes notes about everything that I saw, heard or experienced – and what was relevant to the research. These notes contain (in)formal conversations in (in)formal settlements in São Paulo, the visual practices of urban water infrastructure, my own experiences when it comes to the access of clean drinking water as well as ideas and remarks that came from these conversations, experiences and visual practices. These observations are necessary in order to understand the city, its citizens as well as the discourse – which entails the perceptions and beliefs the social entities have and perceive when talking about topics as urban water infrastructure in relation to what is actually happening. This plays an important role in the research since it shows the debate and the different views between government departments and civil society upon what needs to be done with regard to water governance and urban water management (among other things) in order to strengthen resilience and decrease vulnerability.

Participant observations and field notes were taken into practice when I participated in meetings, presentations, workshops and when I attended the forums in Brasilia:

Participant Observation in Fórum Alternativo Mundial da Água & Fórum Mundial da Água, Brasilia
The Fórum Alternativo Mundial da Água (FAMA) was interesting for my research to see what kind of social movements and NGOs were active in the field of water. I was able to get an idea of what kind of activities were done in order to strengthen resilience and decrease vulnerabilities. Next to this, I was able to conduct an interview with Léo Heller – who works for the United Nations (OHCHR). He told me that OHCHR collaborated with both the federal and state government of Brazil and São Paulo and several social movements of São Paulo to point out the vulnerabilities when it came to the access of clean drinking water. What was great to observe was that Léo Heller was one of the view persons who visited FAMA. Although he might be more active on political levels, he was welcomed by everyone with open arms. What I also observed was the way how I was perceived. A lot of participants of FAMA asked the academics with whom I attended the forum, who I was and what I was doing here. They were not really receptive – probably because I was not from Brazil and I did not speak the language. However, when they found out what I was doing here (and that I was not a threat), they welcomed me with open arms: people tried to talk to me, learning me their native language and introduced me into their culture.

Box 2: Participant Observation during Fórum Alternativo Mundial da Água

3. Conceptual Framework

The problem statement, the justification of the research and the research questions assume that strengthening resilience is important with regard to future natural hazards. The impact of a natural hazard could be diminished when resilience is strengthened. The concept of resilience has a lot of definitions, depending on who is researching the concept and in what context. Resilience, in this thesis and the research it draws on, is seen as a political process defined by state-society relationships. Meaning that the relationship between government and civil society are continuously influencing, adapting to and changing each other in a particular socio-ecological context.

This thesis argues that how and to what extent society is able to anticipate, reduce the impact of, cope with, and recover from the effects of a natural hazard is largely determined by the relationships with the government. Hence the reason that resilience, in this thesis and the research it draws on, is seen as a political process. The argument made is that social actors need to be included in political decision-making processes to influence policies made on a government level. The value of including the knowledge of a local socio-ecological context in setting-up and implementing policies can contribute to strengthening resilience in short and long-term. Besides this key point, this thesis also points out the lack of inclusion of civil society actors in the political decision-making processes in the case study of São Paulo, Brazil. Therefore, the importance of the actions taken by social actors itself to increase the level of resilience in their local socio-ecological context is also considered a key point.

3.1. Resilience

The concept of resilience is originally derived from the background of engineering and ecology. Looking at ecological backgrounds, resilience is defined as "*the ability of a system and its component parts to anticipate, accommodate, or recover from the effects of an event. It can do so through preservation, restoration, or improvement of its basic structures and functions*" (IPCC, 2012 in Yan and Galloway, 2017: 17). In this definition, the impact of a natural hazard depends upon the ability of an ecological system to absorb and adapt to the disturbances it generates. In the case of São Paulo, this thesis shows that political, social and cultural systems also need to be taken into account when defining the ability of the city and its local population to absorb and adapt to the disturbances as an effect of the drought in 2014-2015. Therefore, responses to these disturbances will depend on the scale and severity of the drought as well as the capabilities of, and relationships between, the government and civil society (Yan and Galloway, 2017). For this reason, the definition from the ecological backgrounds has been expanded and its meaning adapted to the social and political sciences: "*the ability of individuals, communities, organizations or countries exposed to disasters and crises and underlying vulnerabilities to anticipate, reduce the impact of, cope with, and recover from the effects of shocks and stresses without compromising their long-term prospects*" (IFRC, 2015 in IFRC, 2016: 23).

Therefore, strengthening resilience entails taking into account ecological, social and political systems in a specific context such as São Paulo. This reason is two-folded. First of all, there is a continuous interaction between ecological systems and social and political systems. Disturbances, shocks and stresses in ecological systems expose the vulnerabilities of social and political systems with regard to their ability to cope with and recover from these changes. The actions of social and political systems can, on the other hand, be responsible for these disturbances, shocks and stresses. Therefore, the ecological, social and political systems are continuously interacting, adapting and changing. To what

extent all these systems are able to anticipate, reduce the impact of, cope with and recover from these changes will determine the level of resilience, the magnitude of a natural hazard and its aftermath in both environmental, social and political terms (Keck and Sakdapolrak, 2013; Yan and Galloway, 2017). Secondly, historically constructed social and political environments are still impacting life nowadays. Decisions that were made decades ago, might still influence political, social and cultural relationships with ecological systems up to the present day (Matin, Forrester and Ensor, 2018). The historical embeddedness of these relationships in society influence resilience thinking – which, nowadays, in practice still turn out to be hard to change in many countries.

The components of the system that can influence ecological, political and social environments are the government – consisting of government levels and departments – and civil society – including local population, social movements and non-government organizations (NGOs) (Yan and Galloway, 2017). Both components can influence these environments in different ways and can, therefore, influence resilience thinking while strengthening resilience in a specific context. It is, therefore, important to look at the constructed state-society relationships within Brazil and São Paulo. However, it is also necessary to understand that both components have their own strengths and weaknesses – influencing resilience in their own manner.

Looking at the government, its influence lays in setting up and implementing policies. By doing this in a manner which is favourable for both the social and ecological environments, it can strengthen resilience. However, it has been argued that politics in Brazil has been historically influenced by elite groups, as will be shown in the following chapter. Elite groups have had control over the setting up and implementation of policies in a top-down manner (IFRC, 2016; Matin et al., 2018). They can preserve these power structures by not including other social groups in political decision-making processes (Yan and Galloway, 2017). This resulted in the exploitation of marginalized groups and ecological systems for decades. Due to this skewed distribution of power and representation of different groups in political decision-making processes and policies, some groups are more resilient and less vulnerable to the impacts of natural hazards than others (Keck and Sakdapolrak, 2013; IFRC, 2016; Yan and Galloway, 2017; Matin et al., 2018). Matin et al. (2018) argues that the government has the power to change this situation as they are in control of the distribution of resources. The decentralization of political decision-making processes and the participation of civil society actors in the establishment of policies are, however, the most important factors when it comes to changing power structures. This thesis agrees with this argument as it points out that society actors need to be included in political decision-making processes to influence policies on a government level. It continues on the argument that this form of state-society relationship can positively influence the level of resilience. Particularly marginalized groups are heavily exposed to the effects and impacts of a natural hazard. The vulnerabilities of these groups were exposed during the 2014-2015 drought in São Paulo. Therefore, they can best pinpoint the social, political and cultural changes that need to be made to reduce the impact of natural hazards. Including these changes in policies, the resilience of marginalized social groups can be strengthened (Yan and Galloway, 2017).

The knowledge and risk perceptions of local situations are exactly the strength of civil society actors. However, technical information and how to deal with certain situations are mostly lacking. The formation of multi stakeholder platforms where multiple stakeholders – including government, civil society actors, experts and academics – come together in order to exchange different forms of

knowledge can be useful. In this way, problems identified at the local level can be combined with different forms of solutions from different actors. This can create new opportunities with regard to the level of resilience and vulnerability (Yan and Galloway, 2017; Matin et al., 2018). However, it needs to be noted that due to deeply rooted power structures, civil society actors might not welcome (the input of) government actors in their multi stakeholder platforms. Meaning that knowledge will probably be lost and the extent of strengthening resilience will not be as high as it could be if all actors were included. Therefore, it is important to consider the state-society relationships in historical power structures and the differences in vulnerabilities among different social groups in this component of the system (Yan and Galloway, 2017).

Although each actor can make an effort to increase the level of resilience according to their point of view and with their own methods, the interconnectedness and the cooperation between these social components is considered as valuable (Yan and Galloway, 2017). This thesis argues that including the knowledge of all components of the system can contribute to strengthen resilience in short-term and/or long-term prospects. Therefore, to what extent different actors can turn their vulnerabilities into strengths, together and on their own, depends upon their capacities when dealing with natural hazards: "*1. Coping capacities – the ability of social actors to cope with and overcome all kinds of adversities; 2. Adaptive capacities – their ability to learn from past experiences and adjust themselves to future challenges in their everyday lives; 3. Transformative capacities – their ability to craft sets of institutions that foster individual welfare and sustainable societal robustness towards future crises*" (Keck and Sakdapolrak, 2013).

Resilience, in this thesis and the research it draws on, is seen as a political process. Meaning that government and civil society actors can influence both environment, urban and social structures and, therefore, also influence the level of resilience. The concept of resilience can be linked to many definitions (IPCC, 2012 in Yan and Galloway, 2017; IFRC, 2015 in IFRC, 2016). These definitions take into account actions with regard to strengthening resilience by different actors that can take place at different moments before, during and after the occurrence of a natural hazard. However, this thesis argues that these definitions are not including the state-society relationships that shape how and to what extent different actors are able to strengthen their resilience. Next to that, this thesis point out that resilience is a process and not a fixed outcome. It is important to take a flexible approach with room for adjustments at the short-term when a natural hazard occurs while keeping in mind the needed actions for strengthening resilience in the long-term (Yan and Galloway, 2017).

3.2. Vulnerability

The most perfect process and outcome of resilience will be that all the different social groups of a society are having the same level of resilience and vulnerability. However, the chance of favouring one social group over another when looking at opportunities to strengthen resilience is highly present. This has the implication that, while increasing the level of resilience of one group, it might uphold that the level of resilience of

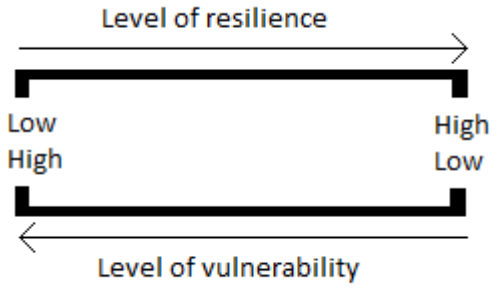

Figure 1: The relation between resilience and vulnerability

another group is decreased (Yan and Galloway, 2017). Therefore, resilience and vulnerability are, at least in this thesis and research, interlinked: a low level of resilience almost always ensures a high level of vulnerability and a low level of vulnerability almost always ensures a high level of resilience.

The concept of vulnerability is then described as: "*the conditions determined by physical, social, economic and environmental factors/processes, increasing the susceptibility of a community to the impact of hazards*" (ISDR, 2004: 42). Since it is the focus of government and civil society to protect the population, vulnerability most often concerns the social structure of a system. Therefore, the concept of 'social vulnerability' is considered as important: "*social vulnerability highlights differences in the human capacity to prepare for, respond to, and recover from disasters. It varies over space and time, and among and between social groups, largely due to differences in socioeconomic and demographic characteristics*" (Hummell, Cutter and Emrich, 2016: 1). This thesis argues that the importance of the actions done by society actors itself to increase the level of resilience in their local socio-ecological context is, therefore, considered as a key point. When decreasing the level of vulnerability, the most significant emphasis lays in the meeting of basic needs and international human rights such as housing, and the access to clean drinking water (Pelling, 2011; Matin et al., 2018). Also, the awareness and the perception of a risk in areas prone to natural hazards are important. To what extent the local population perceives a situation as a risk will directly influence which measures will be taken in order to decrease their vulnerability (Hardoy, Pandiella and Barrero, 2011). When more people are aware of the potential risk they have due to changing social, political and ecological systems, the likelihood of taking action in order to protect themselves will increase (Hummell et al., 2016). State-society relationships play an important role when it comes to warning local populations in time in order to anticipate on a natural hazard – as will be shown in the case study of São Paulo.

Different social groups within one area can experience different levels of resilience as well as vulnerabilities (Yan and Galloway, 2017). The extent to which marginalized groups can participate in political decision-making processes is considered as important. Especially when both government and civil society actors are impacting the same local socio-ecological context by acknowledging different vulnerabilities in the same area. It needs to be noted that when a vulnerable situation in a particular area prone to natural hazards is diminished, this can create a more vulnerable situation in another area (Yan and Galloway, 2017). This is also substantiated by Pelling (2011). He argues that a city can be seen in several different visions which are all interacting with each other. All these different visions of the city are showing the underlying vulnerabilities per vision and how these can be managed. Where government actors may see the city as (e.g.) 'an engine for economic growth', the civil society actors may see it as 'a political and cultural arena'. Resulting that both components of the system will point out, target and decrease the particular vision of the vulnerabilities in order to increase the level of resilience within a local socio-ecological context. A point that Pelling (2011) forgets to make, and this thesis indicates, is that different government and social actors will argue for different practices in order to strengthen resilience. They can do so through political decision-making processes such as participatory governance. Therefore, this thesis argues that resilience is a political process.

Increasing the level of resilience in one are in the city of São Paulo does not imply that the level of resilience in another area is increased as well. The same applies for the inhabitants of São Paulo:

increasing the level of resilience of one social group does not imply that the level of resilience of another social group is increased as well. The latter is also considered as a highly political process as it is defined by state-society relationships. Therefore, the argument of Pelling (2011) does show us that these different visions can display a disconnection between the government and civil society as different local socio-ecological context are continuously influencing, adapting to and changing each other – as a result of these state-society relationships.

3.3. Conclusion

Resilience and vulnerability are, in this thesis, interlinked. When it is argued that resilience is strengthened, it implies that vulnerabilities of a particular local socio-ecological context are pointed out, targeted and decreased. When it is argued that the level of resilience is low, it implies that vulnerabilities are strongly present. Meaning that the impact of a natural hazard will be more severe. In line with this, the level of resilience can differ per local socio-ecological context within the city of São Paulo. Each local socio-ecological context is defined by state-society relationships. As state-society relationships are continuously influencing, adapting to and changing; the different local socio-ecological contexts are also continuously interacting and changing as well.

This chapter will point out that the level of resilience is defined by state-society relationships as resilience is seen as a political process. The argument made is that social actors need to be included in political decision-making processes to influence policies made on a government level. Therefore, this thesis argues that participatory governance and participatory budgeting are tools that can strengthen resilience by targeting the vulnerabilities through policies that are influenced by participatory processes. Even though decentralization process and democratization processes can strengthen resilience, it depends on the extent of the implementation of decentralization processes to what extent civil society can ensure its voice in political decision-making processes. It argues that when there is a disconnection within the relationship between government and civil society actors can be damaging for the level of resilience and defines how and to what extent social actors are able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard. Therefore, the argument is made that social actors need to be included in political decision-making processes to influence policies made on a government level. When this is not happening, the thesis points out the key point that the actions taken by social actors itself to increase the level of resilience in their local socio-ecological context is also considered as important. In order to understand how the state-society relationships in São Paulo, the next chapter will outline the political course towards the governing and managing of the current Republic of Brazil.

4. The Political Course towards the Current Republic of Brazil

how the state-society relationships were defined in São Paulo. This chapter will, therefore, outline the political course towards the current Republic of Brazil. It will start by analysing the different stages of the political development that have led to the current government and governance of the Republic of Brazil. After that, it will continue by analysing the introduction and implementation of water governance in Brazil and São Paulo.

This thesis argues that the historical process of governing the Republic of Brazil, and by that the state-society relationships that it has shaped to the present day, largely determines the level of resilience that was reached at the beginning of 2014 in São Paulo. As the severity of the drought in São Paulo shows, the level of resilience was not high enough to anticipate, reduce the impact of, cope with and recover from the effects of the shocks and stresses the drought created in socio-ecological contexts. Therefore, this thesis points out that the historical state-society relationships of the Republic of Brazil to the present day defines the level of vulnerability for different social groups of Brazil and São Paulo. The case study of São Paulo shows that this was due to a skewed distribution of resources among social groups. Resulting to the outcomes that some social groups were able to anticipate, reduce the impact of, cope with and recover from the drought as others were less capable of doing so. This thesis also argues that even though decentralization and democratization processes were implemented, depending on various factors it might be harder for civil society to ensure its voice in political decision-making processes. This chapter argues that these differences in social groups are due to the state-society relationships that were shaped in history.

4.1. Governing the Republic of Brazil

Political, social, cultural and economic structures and relationships present in the current Republic of Brazil, descend from the time when Brazil was ruled by Portugal: the Colonial Era (Chalmers, 1977; Bethell, 2000). In 1821, Brazil became independent and had the opportunity to establish its own government. The authoritarian regime of Portugal was, however, replaced with a monarchy. In practice, this form of ruling did not differ much from the Colonial Era. In 1889, Brazil declared itself a Republic. The monarchical regime was, however, replaced with an authoritarian institution: the military. Chalmers (1977) argues that an institutionalized state sees politics as a routinized decision-making process where the opportunities of the local population to democratically elect its own governing party and president are taken away. Instead, the government of Brazil during this period, consisted of small "*groups of individuals that due to their economic resources, expertise/knowledge, social networks or positions in political or other organizations stand in a privileged position to influence in a formal or informal way decisions and practices with key social and environmental implications*" (Bull, 2015: 18 in Bull and Aguilar-Støen, 2016 in Castro, Hogenboom and Baud, 2016). These elite groups were included and able to participate in elections and influence political decision-making processes (Bull and Aguilar-Støen, 2016 in Castro et al., 2016).

The declaration of the Republic of Brazil could be interpreted as the transformation from an institutionalized state to a politicized state. Chalmers (1977) argues that a politicized state sees the political decision-making processes, influenced by both the government and civil society, as one of the factors that shapes the contexts of the country. Next to this, civil society actors and its actions, the international community and the establishment of (private) companies and businesses also shapes the contexts of the country on all levels – as is argued in this thesis. However, over the past

century, the elites tried to maintain their power during the different stages of the political processes. This thesis argues that these historical processes have defined the level of resilience and vulnerability over the past century up to the present day. In the following sections, these historical processes of the political development towards the Current Republic of Brazil will show how and to what extent this has influenced the level of resilience and vulnerability.

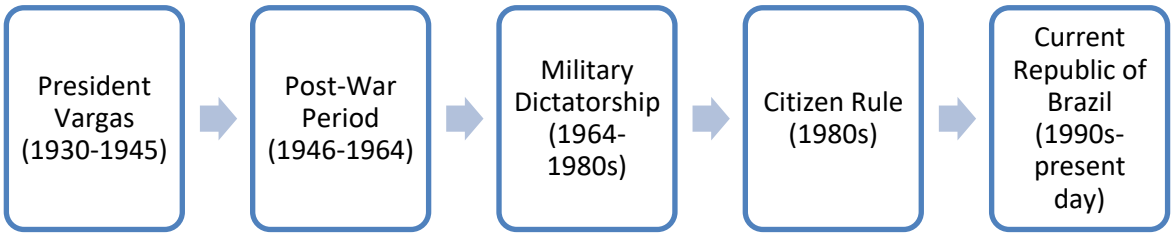

Figure 2. The political processes of the Republic of Brazil

4.1.1. From President Vargas (1930-1945) to Military Dictatorship (1964-1980s)

The elite groups (upper class) and the middle class, those whom were not part of the upper class but had more power and resources than the working class, were already part of the political decision-making processes. From the 1930 onwards, democratization processes were slowly introduced under the government of President Vargas (Interview Fracalanza, 2018). Meaning that different social groups, both male and female, were included and were able to influence political decision-making processes. In order to be able to vote in the democratic elections, the members of the social groups needed to be part of the urban working class (Bethell, 2000). However, there were some extra requirements. First of all, a person was only able to vote when they were registered at their work and had a *'carteira'* – which is proof that they were working and were contributing to the economic development of Brazil. Only with this cart, a person was able to vote (Welch, 2004). Secondly, if you were illiterate, you were not able to vote. Lastly, if you were part of the rural population, you were not able to vote either. Even though accepting different social groups was a big step forward in the right direction when it came to creating a democratic state, it still meant that large parts of society were excluded (Bethell, 2000).

Introducing democratization processes did not necessarily mean that Brazil was a democracy. In the government there was a distinction between the left-wing and the right-wing parties. On the one hand, right-wing parties mostly consist of political classes such as the elite groups and the military. They stand for economic development by industrialization processes in states where the economic incentives are high, such as in São Paulo, Minas Gerais and Rio de Janeiro (Bethell, 2000). On the other hand, left-wing parties mostly consists of different social groups. Most of these social groups are marginalized. In the case of Brazil, this meant that the supporters of the left-wing groups were those people that were previously excluded from political decision-making processes (Bull and Aguilar-Støen, 2016 in Castro et al., 2016). Democratic elections were highly manipulated by the elites and left-wing parties were declared illegal at the moment their influence became too high. The process of moving forward to a politicized state and moving backwards to an institutionalized state, is perfectly described by Bethell (2000): "*When the costs of overthrowing democracy and resorting to authoritarianism are high and the costs of tolerating democracy low, democracy is likely to survive. But when its interests are threatened by forces favouring a significant distribution of wealth and power, there is always a possibility that it will look to the military to overthrow democracy*" (12).

Under President Vargas, the elites supported a military coup twice in order to keep their power and benefits by suppressing the left-wing parties (Chalmers, 1977): after the establishment of the Constitution in 1934 and during the democratic elections of 1938 (Bethell, 2000). The establishment of the Constitution in 1934 noted that social groups have a voice which they can use to influence political decisions on social and environmental issues (Griesse, 2007). However, these democratization processes were stopped and the state ruled, again, from a top-down level (Chalmers, 1977; Bethell, 2000). During the democratic elections of 1938, left-wing parties were gaining much influence due to the support of marginalized groups, consisting of a large number of social actors, that were still excluded from political decision-making processes (Bull and Aguilar-Støen, 2016 in Castro et al., 2016). According to the elites, this influence was too big and in fear of losing their power and benefits, a military coup was committed in the same year and President Vargas stayed in power (Bethell, 2000). Therefore, it can be argued that right-wing parties are governing Brazil as an institutionalized state, whereas left-wing parties can transform the country into a politicized state – as has been argued by Chalmers (1977). In the years after the Second World War, the institutionalized state of President Vargas was replaced by a more politicized one. Different social groups were included in democratization processes and could, therefore, influence decision-making on a political level. The state-society relationships in this politicized state were seen as more flexible than the ones in the institutionalized state. They differed per local level and socio-ecological context and were able to adapt when circumstances were changing (Chalmers, 1977). This thesis sees this as a move forwards as this flexibility can strengthen resilience of different social groups as well as ecological contexts.

From the post-war period till the 1960s, globalization processes were more intensified than before. This meant that state-society relationships needed to be changed and adapted according to the influence of the international community. The international community influenced the state of Brazil by distributing large amounts of international funding, through businesses or partnerships. This created the opportunity for Brazil to modernize itself in social and economic terms (Chalmers, 1977; Victor, Almeida and Wong, 2015). Due to the existence of the politicized state in these decades, large amounts of civil society of Brazil profited of these economic incentives. Even though there was a politicized state with more democratization processes than in the years before, Brazil was still not a democracy. With the occurrence of these economic incentives, left-wing parties demanded for more political, social and economic change: all the aspects of civil society needed to be included in the political decision-making processes. The result was that Brazil relapsed in the same structures as it was in the decades before: the elites were afraid that they needed to share their power and benefits with the entire state of Brazil. They looked at the military and Brazil returned to its familiar authoritarian military regime in 1964 due to a military coup and civil society was, again, controlled by the state and its elite powers (Chalmers, 1977; Bethell, 2000).

4.1.2. Citizen Rule and the Current Republic of Brazil (1980s-Present Day)

The politicized state seemed to return in the 1980s. It started with the establishment of the Federal Constitution of 1988 – which is still in practice today. In this Constitution it was noted that all the inhabitants of Brazil were included and able to influence political decision-making processes. Also, the laws, rules and regulations noted by the federal government were decentralized among Brazils' states. Participatory governance and processes were an important factor in realising this

decentralization (Griesse, 2007; Wampler, 2012; Victor et al., 2015). These changes led to the first fully democratic elections in 1989, where left-wing parties such as the Workers' Party (*Partido dos Trabalhadores*) could also participate. It was also the first election where the military was not participating – even though the Constitution noted that the military could intervene in a political process when they were not agreeing with the outcome. The 1989 elections were won by President Fernando Collor who was considered the best option for the elite groups, some parts of the middle and working class including experts and academics and to a small part of the lower classes (Bethell, 2000). For the first time in history, it could be said that Brazil was officially a democracy (Wampler, 2012; Castro et al., 2016).

The reverse side of this were the corruption charges. The first president that was impeached of corruption practices was President Collor. In 1989 it looked like President Collor won the democratic elections in a fair way. However, as it was shown in 1992, this was not the case. Almost every president that was in charge since the 1989 elections has been accused of corruption practices (Bethell, 2000). One can wonder if this is another legacy of the institutionalized state of Brazil: are the corruption charges because of the fact that there were truly corruption practices? Or do these charges exist because there are still elite groups that are trying to control the democratization processes? Will this eventually result in Brazil being governed as an institutionalized state, again? It is difficult to answer these questions – something this thesis will not do. However, there are measures that can be taken and demanded in order to check the state and legitimize its power (Chalmers, 1977). This can be done from a top-down level as well as from a bottom-up level. The demand for transparency is such a measure.

Next to the democratization processes of the 1980s, the 1990s were central for the fast increase in civil society organizations such as social movements and non-governmental organizations (NGOs). Although Brazil and its population have always been aware of its environmental and water-related issues such as deforestation and water pollution, it was in the late 1980s and the beginning of the 1990s when civil society demanded the state government to take better care of its natural resources (Castro et al., 2016). During the democratic elections of 2003, the Workers' Party acknowledged this demand. Next to this, they promised more participatory processes to improve the social structures in Brazil – with specifically prioritizing the demands of the marginalized population. This happened when the Workers' Party was elected and President Lula da Silva became president (Griesse, 2007; Wampler, 2012; Castro et al., 2016). The marginalized population of Brazil was able, for example, to educate themselves without the need of paying college fees. Therefore, they were able to improve themselves on a social and economic level (Interview Local-4, 2018). However, President Lula did not escape from the accusation of corruption practices and needed to step down. In the present day, former President Lula was put in prison in July 2018 after the so-called investigation of its corruption charges. However, it should be noted that Lula was again running for president during the elections of 2018. Due to his influence, the local population of Brazil believed that Lula was put into prison to prevent another radical social change in Brazil – one that would have been better for the local population. Again, one might wonder if the elites are still in power behind closed doors.

4.1.3. Historical Changes in Resilience

The continuous regime shifts that are going back and forth with regard to accepting democracy might seem very drastic for civil society. However, in practice this is not the case because the state-society

structures and relationships have not changed that much (Chalmers, 1977). During the different political changes, at least in the period of the 1930s-1980s, it were always the elites that were in power. There was always a small group of individuals that were defending their own power, interests and benefits. It, therefore, also meant that elites were always coordinating how and to what extent democratization processes played a role (Bethell, 2000). In terms of resilience, this meant that overall nothing had changed. The power and resources needed to organize and mobilize when a natural hazard occurs, were in the hands of the elite groups. They were the ones that were able to anticipate, reduce the impact of, cope with and recover from the disturbances a natural hazard created. The marginalized population, on the other hand, did not had access to the same resources. Their level of resilience did not change as the distribution of the needed resources was not changed. They were as vulnerable to the disturbances of the systems as they have always been.

Of course, the introduction of democratization processes in every period included more social groups in political decision-making processes. But in the end, these groups only represented a segmented part of Brazil's society and were necessary to preserve the power of the elites. Even with the establishment of the Federal Constitution in 1988, where it was stated that all the inhabitants of Brazil were included in the political decision-making processes, there were no significant changes that resulted in a stronger resilience: again, the situation stayed the same. This was due to the fact that the implementation of the Constitution in practice was lacking in Brazil. A legacy that is still present nowadays as will be shown in the following sections (Victor et al., 2015). Although nothing had changed with regard to resilience, the elites showed us that participatory governance in political decision-making processes is important. By including certain segments of society that only benefits the elite groups, they show us that the influence of different segments of society are important when talking about strengthening resilience. When they would not have had the legitimacy of these segments to exercise their power, there could have been the possibility that the elite groups were going to be overthrown by other social groups in Brazil. In that case, the distribution of the resources needed to organize and mobilize when a natural hazard occurs would have been straightened across all social groups. The resilience of the elites would have been strong but the other social groups of Brazil would also have had the chance to target their particular vision of vulnerabilities and, therefore, strengthen their resilience. Hence, the inclusion of all segments of society in political decision-making processes is important to target vulnerabilities and strengthen resilience.

When Lula was President of Brazil, vulnerabilities were targeted and resilience was strengthened. Due to the policies that were put in place during his presidency, the most marginalized groups of Brazilian society were able to decrease their vulnerabilities and strengthen their resilience (Interview Local-3, 2018; Interview Local-4, 2018). The marginalized groups have always been excluded from political, social and economic structures in the past. Due to the fact, for example, that they were illiterate and poor, they were never able to voice their opinion in political decision-making processes because they were not recognized. When giving them the opportunity to educate themselves, they can improve their own circumstances. Getting an education mostly leads to getting a job which leads to economic incentives. These economic incentives can be used in order to target other social vulnerabilities such as health, housing and the access to clean drinking water and food. Therefore, these social groups were able to decrease their vulnerabilities and increase their resilience. When a natural event occurs, they have the resources to organize and mobilize themselves. Meaning that

they are able to reduce and cope with the impacts of the natural hazards and recover from these effects.

4.2. Water Governance in Brazil

The Federal Constitution of Brazil in 1933 resulted in the enactment of the Brazilian Water Code in 1934. Although this Code touched upon the solutions with regard to water issues, the problem laid in the enforcement of this Code throughout Brazil (Kelman and Porto, 2000). That seemed to change when the Code was updated in 1988 and resulted in the National Water Act: a Constitution that is still in place today. In addition to this, the federal government also passed a New Water Law that specifically focussed on the urban water management combining environmental and social structures (Victor et al., 2015). The transition from the Brazilian Water Code to the National Water Act was heavily influenced by the pressure of civil society actors due to democratization processes that happened in the 1980s (Braga Jr., 2000; Interview Fracalanza, 2018). The recognition of environmental and water-related issues was not diminished in this transition and federal rules and regulations considering these issues were still determined.

However, the influence of civil society as well as the democratization processes had a significant effect upon the establishment and implementation of the National Water Act. The most important change made was the decentralization from the federal government to the state and municipal governments with regard to the management of water resources, among other things (Wampler, 2012; Hamilton, 2014). How and to what extent the federal rules and regulations were implemented in every state was decided by the government of each state. In addition to this, a tool of the decentralization processes was participatory governance where civil society gets the opportunity to have a voice in political decision-making processes on water-related issues in every state, among other things (Acharya, Houtzager and Lavalle, 2005; Griesse, 2007). Meaning that how and to what extent rules and regulations are implemented in each state are decided by both civil society and the government of the state. In this thesis, this is an important aspect. Brazil showed that it was capable to understand that different states had different needs according to their own socio-political, economic, environmental and cultural aspects. It showed that Brazil understood the importance of the knowledge of the local population by making participatory governance obligated when implementing decentralization processes. In this way, each state could determine together with its population their particular vision of resilience and vulnerability with regard to (e.g.) water-related issues and what needed to be done in order to increase their resilience. The different views of the city or of the local level are targeting their particular vision of vulnerabilities in different local socio-ecological context – whether this is short- or long-term.

4.2.1. Water Governance in São Paulo, Brazil

São Paulo was the first state of Brazil that established and implemented its own version of the National Water Act in 1991: Law n° 7,663 – The State Water Policy (*Da Política Estadual de Recursos Hídricos*) that is combined with the Integrated Water Resources Management System (*Sistema Integrado de Gestão de Recursos Hídricos*) (World Bank, 2012). The implementation of the State Water Policy was supported with the creation of several policy instruments in order to increase participatory processes with regard to urban water management (Victor et al., 2015; Barbosa et al., 2016). First of all, the most significant policy instrument is the River Basin Committee – which is a committee that is assigned to a particular river basin within a state in order to determine if and to what extent the government of the state is upholding itself to policies. These committees have an

equal number of representatives of the state government, the local government and parts of civil society in order to make sure that no representative has an extra incentive in joining the participatory process (Haglund, 2015; Barbosa et al., 2016; Interview Fracalanza, 2018). It is necessary to define that the state can only make decisions upon rivers that are only present in their own state. When a river flows through multiple states, such as through São Paulo and Rio de Janeiro, the federal government is responsible for decisions about the river (Kelman and Porto, 2000; World Bank, 2014). Secondly, national policy instruments were also implemented such as the National Water Agency (ANA), the Environmental Agency (*Companhia Ambiental do Estado de São Paulo – CETESB*) – which is responsible for the quality of the water – and the Water and Energy Agency (*Departamento de Águas e Energie Eléctrica – DAEE*) – which is responsible for the quantity of the water (Barbosa et al., 2016). These national instruments are working together with (e.g.) the river basin committees to ensure the distribution and access to clean drinking water.

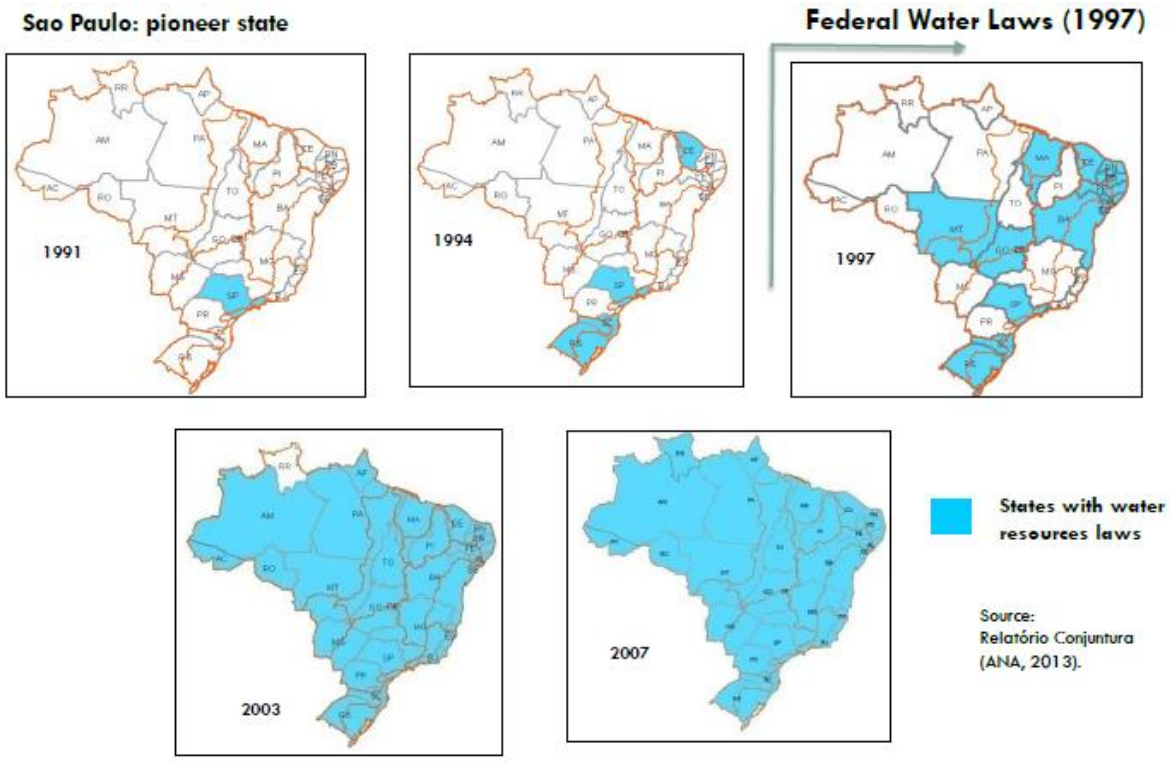

Figure 3: The process of the acceptance of water laws over time (ANA, 2013 in World Bank, 2014).

The fact that São Paulo was the first state that accepted the National Water Act and established and implemented its own version of the Act in its own state, says that São Paulo might be a precursor in the field of water governance and water management. As can be seen in the figure, it took more than a decade to make every state of Brazil accept the National Water Act (ANA 2013 in World Bank, 2014). Still, not every state in Brazil is considered as advanced in the implementation of water governance and water management as São Paulo is (Barbosa et al., 2016). This is worrying for a couple of reasons. First of all, the implementation of the federal rules and regulations of the National Water Act is obligatory after its acceptance. The implementation and fulfilment of the State Water Policy in São Paulo depends on the governor of the State of São Paulo. Depending who is in charge and what his/her political agenda is also determines to what extent the State Water Policy is implemented. During the 1980s, when democratization processes were rising, environment and

water-related issues arise on the political agenda as well. Meaning that people were able to show the federal and state government the importance of the protection of water. However, in the present day, the democratization processes are decreasing as Fracalanza (2018) explained during the interview. Civil society is having less and less influence in political decision-making processes and decentralization and participatory processes are not considered as extremely important anymore when looking at the last years (Interview Fracalanza, 2018).

This brings me to the second point: even though participatory processes might be part of the decentralization process established by the National Water Act and the State Water Policy, depending on who the governor of the State of São Paulo is, also means that the extent of the implementation of decentralization processes differs. Therefore, it is harder for civil society to ensure its voice in political decision-making processes. This point is also made by Hanashiro (2000). Next to this, when the voice of civil society is not taken into account when it comes to political decision-making processes on water-related issues, it might also be a bad indication when it comes to increasing resilience and decreasing vulnerability. The State of São Paulo might have no idea what is going on at the local level when they are establishing and implementing policies via a top-down manner. It can result in more environmental degradation and more water pollution. Bringing São Paulo to an even worse state than it already is. This debate about decentralization in political decision-making continuously occurs in Brazil as will be shown later.

4.2.2. Water Governance and Changes in Resilience in São Paulo, Brazil

In 1991, São Paulo was considered as one of the most advanced states when it comes to water governance and water management. If that is the case, what makes it that the state and its local population were so badly affected by the drought of 2014/2015? For what reasons did the State of São Paulo not change its policies, infrastructures and emergency measures in order to strengthen resilience to anticipate and reduce the impact of the drought? Instead of coping with and recovering from the immense effects during and after the drought? The main reason for this, leading from this chapter, is the lack of implementation of federal and state policies in practice. Decentralization processes are, for example, considered as important with regard to targeting particular visions of vulnerabilities and strengthening resilience. Implementing decentralization processes is necessary but the process and outcomes itself are even more important. In order to decentralize the decision-making process, as will be shown in this thesis, a good understanding of the policies as well as the different local socio-ecological contexts is needed. Therefore, this thesis argues that a collaboration between segments of the government and civil society are necessary to make decentralization processes work but also to target vulnerabilities and strengthen resilience (Tierney, 2012).

4.3. Conclusion

In terms of history, Brazil has showed that it continuously shifts between an institutionalized state, a politicized state and everything in between. There is still a top-down order where elites and ruling parties are exercising power without consulting civil society. It also showed that Brazil was capable of establishing policies in favour of different socio-ecological contexts by leaving it to the state government to decentralize the policies. Although the intentions of Brazil were good, the case study of São Paulo shows that the implementation of these policies are lacking. The chapter points out that even though decentralization processes might be implemented, it depends on who the governor of the State of São Paulo is to what extent the decentralization processes are implemented. Therefore, it can be harder for civil society to ensure its voice in political decision-making processes.

This thesis argues that understanding state-society relationships are important when looking at the concepts of resilience and vulnerability. The chapter points out that how and to what extent society is able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard is largely determined by the relationships with the government. It is pointed out that both government and civil society are needed to strengthen resilience and decrease vulnerabilities. Therefore, the argument is made that society actors need to be included in political decision-making processes to influence policies made on a government level. In order to see how civil society actors can be included in political decision-making processes, the next chapter will outline how participatory processes can be contribute to this key point made in the thesis.

5. Participatory Governance in São Paulo, Brazil

The previous chapter showed how the state-society relationships in the history of Brazil and São Paulo, contributed to the level of resilience during the drought of 2014-2015. It pointed out that how and to what extent society is able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard is largely determined by the government. Hence the reason that resilience is, in this thesis and the research it draws on, seen as a political process. A part of this political process is the inclusion of social actors in political decision-making processes to influence policies made on a government level. This chapter will, therefore, focus on democratization and decentralization processes in Brazil and São Paulo that can influence state-society relationships to increase the level of resilience. It will start by analysing participatory governance and participatory budgeting in both Brazil and São Paulo. After this, instruments for upholding the state to include democratization and decentralization processes are discussed as well.

This thesis argues the importance of the inclusion of civil society actors in the political decision-making processes to influence policies made on a government level. The value of the knowledge of the local situation can be brought into the specification of the setting-up and implementation of policies. Therefore, this thesis argues that participatory governance and participatory budgeting are tools that can contribute to strengthen resilience by targeting the vulnerabilities through policies that were influenced by the social actors in participatory processes. This thesis points out that it is important to evaluate and monitor the implementation of participatory budgeting programs in the local situation. When talking about participatory governance, it is important to use instruments for upholding the state to include democratization and decentralization processes in political decision-making. These instruments are 'accountability' and 'transparency'.

5.1. Participatory Governance

The establishment of the Federal Constitution in 1988 stated that all segments of society need to be included in democratization processes. In 1991, São Paulo took the lead when it came to advanced water governance and water systems in combination with participatory governance processes. Wampler (2012) argues that "*participatory governance programs, which institutionalize government-civil society interaction through the promotion of public deliberation and decision-making, are being adopted by local governments to harness a wide range of outcomes believed to be positively associated with citizens' and civil society organizations' active involvement in public life*" (1).

Participatory processes can be considered as a tool by the federal government of Brazil and the state government of São Paulo to include the local population in the political decision-making processes. Decentralized federal policies were implemented accordingly to the particular socio-ecological contexts of the state. Via decentralization and democratization processes, the existing state-society relationships can be altered according to the structure of the politicized state – which is a state where political decision-making processes influenced by government and civil society can shape the contexts of a country as Chalmers (1977) argues. In this way, civil society is able to voice its opinion and influence the outcomes of policies or participatory budgeting programs (Wampler, 2012). It is argued in this thesis, that democratization and decentralization processes can improve local socio-ecological contexts in (e.g.) São Paulo. Decentralized policies, such as the outcome of participatory budgeting processes, influenced by social actors can target their particular vision of vulnerabilities since the opportunity to participate in political decision-making processes on a local government

level was given to them. Therefore, social actors are able to increase their level of resilience (Acharya et al., 2005; Griesse, 2007; Hamilton, 2014).

Important civil society actors that can mobilize and organize the local population in attending participatory governance processes are the social movements and NGOs. These social actors are most of the time directly connected with the local population in a particular local socio-ecological context. Therefore, they are aware of the particular vision of vulnerabilities by the local population in a particular local socio-ecological context. Most of the time, these social actors are respected as "*private non-profit legal entities without lucrative purposes that do not distribute their profit and implement activities to achieve their social objectives*" (Europe Aid, 2015: 1). As they represent impartially the interests of different social groups of different local socio-ecological contexts in government levels, the local population of Brazil is often willing to work with them. Especially since these social actors can open space for the local population to participate in political decision-making processes and can have a positive influence on state-society relationships. However, Acharya et al. (2005) and Haarstad et al. (2013) argue that in São Paulo these civil society actors most often have deeply rooted ties with political parties – that might even derive from historical processes. Having ties with political parties is not necessarily considered as wrong: they can help with representing social groups in government levels, open spaces for democratization and decentralization processes, influencing state-society relationships and they can distribute knowledge from government levels to the local population (Acharya et al, 2005; Interview Checco, 2018). However, it does depends how deeply rooted these political ties are and how social actors are influenced by these in practice.

By using these political ties in an appropriate manner – meaning that they are used to represent social groups in government levels without gaining economic incentives – civil society actors can influence government levels and departments to take action to target the particular vision of vulnerabilities of the local population in a particular local socio-ecological context. Therefore, state-society relationships and political decision-making processes can be positively changed and resilience can be strengthened (Wampler, 2004; Haarstad et al., 2013; Bretan and Engle, 2017). Also, the civil society actors that have ties with political parties can influence the democratization and decentralization processes in both the top-down and bottom-up manner. They can influence government levels and departments to strengthen resilience in a particular local situation. But they might also have the resources to create a multi stakeholder platform where knowledge, expertise, data, resources and technologies can be exchanged. Therefore, they can increase the awareness of the local population of their particular vision of vulnerabilities (Interview Checco, 2018). Not only can the local population target their vulnerabilities and strengthen their resilience on their own, they can also improve their influence in political decision-making processes of policies: they know what they are talking about and how they need to approach this in government levels (Bretan and Engle, 2017).

However, when these ties are not used in an appropriate manner – meaning that they are used to gain economic incentives – it can be argued that parts of Brazil are going to be ruled under the structures of an institutionalized state. Meaning that democratization and decentralization processes will not be implemented in practice and state-society relationships will be controlled by government levels. This is due to the fact that social actors abused and exploited local situations and inhabitants for economic incentives (Wampler, 2004). When this is happening in Brazil and/or São Paulo, the thesis argues that it is very hard to implement participatory governance processes in practice. This is

due to the fact that it is not possible to have democratization and decentralization processes when there is an institutionalized state that is centralizing all the decisions and is closing the opportunity for the local population to participate in political decision-making processes (Barbosa et al., 2016). In the case of São Paulo, democratization and decentralization processes were supposed to be implemented according to the State Water Policy in 1991. Even so, Fracalanza (2018) pointed out during her interview that this also included the decentralization of political decisions and emergency measures during crisis situations. However, during the drought of 2014-2015, the decisions made were centralized by the government of São Paulo and social actors were left out in these political decision-making processes (Interview Fracalanza, 2018). This negatively affected the state-society relationships between the local population and the government of São Paulo (Haarstad et al., 2013). Yet, it needs to be taken into account that democratization processes are relatively new in Brazil: the Brazilian Federal Constitution in 1988 and the State Water Policy in São Paulo in 1991. Therefore, the institutions that are needed to uphold the federal and state government to the implementation of democratization and decentralization process do not exist yet or are not fully developed yet (Victor et al., 2015).

One major pitfall that is continuously occurring in Brazil and São Paulo is that the focus is laid on short-term solutions. Political decision-making processes are not focussed on long-term prospects (Wampler, 2004). During the crisis situation of the 2014-2015 drought, the government of São Paulo focussed on building an interconnected system of water reservoirs without taking into account the broader socio-ecological impact this could have (Volume Vivo, 2015). They were focussed on restoring the supply of clean drinking water without taking into consideration that their actions could have an impact on long-term availability of clean drinking water due to the fact that they impacted the ecological systems (Volume Vivo, 2015). Therefore, this thesis argues that government and civil society actors need to cooperate in order to make each other aware of the particular vision of the vulnerabilities in a local socio-ecological context. Therefore, they can target these particular visions of vulnerabilities in a way that they are able to strengthen short and long-term resilience.

5.2. Participatory Budgeting

At the same time participatory governance processes were introduced during the democratization processes in the 1980s, participatory budgeting was also initiated. These processes turned out to be a perfect tool for all segments of civil society to participate in political decision-making processes (Hamilton, 2014). "*Participatory budgeting is a type of participatory democracy in which citizens, rather than city councils and mayors, choose how to spend select municipal funds*" (Hamilton, 2014: 18). Meaning that the state gets a particular amount of funding from the federal government to spend on environmental and water-related issues, among other things (Griesse, 2007). Instead of having the state government decide which projects are most important and where to spend the most money, this decision-making process is left to civil society – who have a better view on the most important environmental and water-related issues present in their area. Therefore, there is a decentralization process taking place from the state government to the municipal and local government with regard to deciding which vulnerabilities according to their particular visions need to be targeted and how funding needs to be spent (Wampler, 2012; Hamilton, 2014).

Influencing the outcome of participatory budgeting programs turned out to be more significant to civil society than influencing the outcome of political decision-making processes on the federal or

state level as they believed that they could exercise their power and agendas through participatory processes (Wampler, 2012; Rede Nossa, 2016). This is due to the fact that participatory budgeting programs in São Paulo are focussed on the specific local socio-ecological context. Resulting in the fact that the lives of social actors are being directly influenced. Civil society actors are more empowered to attend participatory processes when the outcome of these processes are directly influencing their own lives (Wampler, 2012). Also, the most marginalized social groups of São Paulo have shown to be more involved in the budgeting programs than during political decision-making processes on a higher government level. This is due to the fact that the (economic) costs of attending participatory budgeting processes are significantly lower than attending political decision-making processes (Hamilton, 2014). By including the most marginalized social groups of São Paulo in participatory budgeting processes, their particular vision of vulnerabilities can be pointed out and targeted. Resulting that their level of resilience can also be increased. The inclusion of these social groups are of importance since historical political processes have shown that these groups were mostly left out of the political decision-making processes (Wampler, 2004).

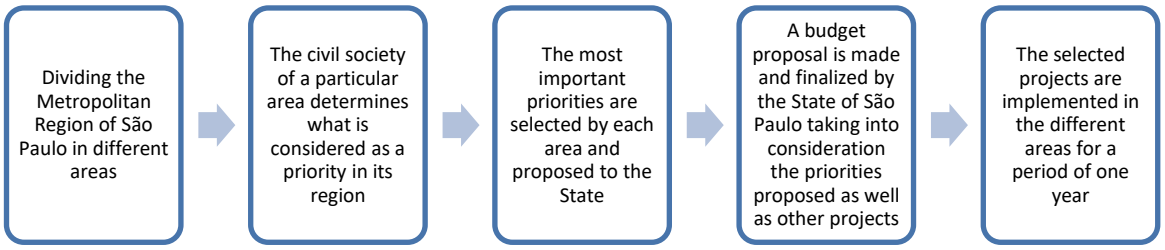

Figure 4: Participatory Budgeting Process in São Paulo based on Hamilton (2014)

In the table above, based on the participatory budgeting process described by Hamilton (2014), it is shown that different areas in the state of São Paulo have the opportunity to target the vulnerabilities that are most necessary to be decreased. What is considered as a priority is determined by all the actors of civil society: from the elite to the most vulnerable groups in the area, everybody has a say in the political decision-making process. Therefore, everybody also influences the political decision-making processes on a local, municipal, state and federal level. Again, state-society relationships are changed due to the improvement of democratization and decentralization processes in the state of São Paulo (Wampler, 2004; Wampler, 2012). An important part of this is that, while discussing which issues are prioritized over another, a dialogue between different stakeholders occurs on the different government levels. Hereby, knowledge, technologies, data and resources are shared before making a final proposal of which cases are prioritized over another (Wampler, 2012; Rede Nossa, 2016).

The selected projects are implemented for a period of one year. During this year, civil society actors work together with different government levels and departments – and possibly private companies and businesses – in order to implement the program in such a way that it benefits the local socio-ecological context. Therefore, vulnerabilities are pointed out and targeted according to particular visions and the resilience of the area and its inhabitants can increase (Wampler, 2004; Wampler, 2012; Rede Nossa, 2016). If one of the projects, for example, is focussed on the construction of better water infrastructure in the informal settlements of São Paulo, this might have the implication

that in times of droughts these people have more access to clean drinking water than they had during the drought of 2014-2015. Therefore, their long-term prospects in resilience can be increased. In the present day in São Paulo, implementing such a project also links back to the state-society relationships. As the following chapter will show, informal settlements are legally not part of the city of São Paulo and are, therefore, not connected to the water infrastructure systems (World Bank, 2012; Victor et al, 2015). For this reason, this thesis argues that some state-society relationships are harder to overcome. It will take more time and more implementation of democratization and decentralization processes before the government of the city of São Paulo will recognize that the informal settlements also are entitled to water infrastructure systems.

5.3. Accountability and Transparency

Although the Federal Constitution of Brazil and the State Water Policy of São Paulo state that political decision-making processes should be decentralized and democratized, the implementation of the processes and its outcomes is often lacking (Wampler, 2012). In order for participatory processes to work, this thesis argues that it is needed that these processes and programs are monitored and evaluated. Whether or not these processes and programs are working is also determined by the level of transparency and accountability that can legitimize the power and actions of the state (Haarstad et al., 2013; Bretan and Engle, 2017).

Transparency is considered as "*the access to information to be provided by the state and any other actor involved in the decision-making processes that guide the management*" of, in the case of São Paulo, water resources (Empinotti, Fracalanza and Jacobi, 2016). Transparency is considered as an instrument of accountability. Accountability can either be "*associated with electoral or societal control*" or it can be associated with "*legal authority to take action in relation to actions or omissions by other state agencies*" (Aranha, 2017: 4). A lack of transparency can impact the accountability of the state or state agencies. In the case of São Paulo, SABESP – *Companhia de Saneamento Básico do Estado de São Paulo* – lacked the availability of information during the drought of 2014-2015. By not distributing the information, they were considered as not transparent. Therefore, they were held accountable by the inhabitants of São Paulo as well as the social movements and NGOs. They were demanding information regarding the water levels of the water reservoir systems (Interview Checco, 2018; Questionnaire Água Sim, Lucra Não, 2018). In the end, SABESP distributed the information. However, a lot of the documents were 'blacked' – meaning that information was marked in a black colour as these sentences could not be read. When linking the availability of information to resilience, this thesis argues that social actors cannot anticipate to natural hazards such as the drought of 2014-2015, and therefore, they cannot introduce measures to reduce the possible impact of the drought when important information is hold back.

Civil society actors are influencing participatory governance processes and participatory budgeting programs. Due to the fact that the lives of social actors are directly influenced, they are mobilized in order to pay attention to what extent the state, municipal and local government are implementing the outcomes of participatory processes. Therefore, transparency can be used as an instrument in order to hold the government levels accountable as well as to monitor and evaluate the outcomes of the participatory budgeting processes (Empinotti et al., 2016). In some circumstances, the river basin committees are a good example of a structure that is implemented and that can hold the government accountable for its actions (Kelman and Porto, 2000). Especially in Brazil this is necessary

since government levels and departments might take advantage of certain situations by not implementing policies – which can lead to corruption practices. As history has showed, and as was mentioned in the previous chapter, corruption is not uncommon in Brazil. However, there is not one institution implemented in Brazil that is monitoring corruption (Victor et al., 2015; Aranha, 2017). Empinotti et al. (2016) suggest that social actors could be the one that can held government levels accountable through transparency and the monitoring and evaluation of participatory processes as it is the government levels that are governing social actors. However, Empinotti et al. (2016) seem to forget that this suggestion directly impacts state-society relationships. When Brazil is governed as an institutionalized state, democratization and decentralization processes will not be implemented. Moreover, it would not be possible that social actors could held the government accountable for their actions since social groups could be excluded in political decision-making processes. Still, this thesis argues that it is important to evaluate and monitor the implementation of participatory governance processes and participatory budgeting programs in the local socio-ecological contexts and to held the government accountable for their actions through the means of transparency. However, it should be done in a way that there is no room for corruption practices. It should also be done in a way that it could function under the institutionalized state.

5.4. Conclusion

As is shown in this chapter, participatory governance and participatory budgeting implemented in São Paulo can have an effect on the level of resilience and vulnerability. The inclusion of valuable knowledge of a particular local socio-ecological context can be brought into the setting-up and implementation of policies that are affecting a local situation. This can be done through multi stakeholder platforms where multiple stakeholders – including government, civil society, experts and academics – come together in order to exchange different forms of knowledge that can be useful. However, it needs to be noted that due to deeply rooted power structures, civil society actors might not welcome (the input of) government actors in their multi stakeholder platforms. Meaning that knowledge will probably be lost and the extent of strengthening resilience will not be as high as it could be if all actors were included. Also, when information is not distributed by government actors, they can be considered as not transparent and can be held accountable by social actors.

This thesis argues that how and to what extent society is able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard is largely determined by the government. The inclusion of social actors in the political decision-making process to influence policies made on a government level is considered as important in this thesis. Therefore, this thesis argues that participatory governance and participatory budgeting are tools that can contribute to strengthen resilience by targeting the vulnerabilities through policies that were influenced by the social actors in participatory processes. The state can be held accountable by social actors if they implement democratization and decentralization processes. The following chapter will outline how state-society relationships and the implementation of participatory processes are taken place in São Paulo during the drought of 2014-2015.

6. São Paulo's Post-Drought Analysis

The previous chapters showed how historical state-society relationships shaped the governance and management in Brazil and São Paulo in the present day. It also showed how participatory processes can contribute to the inclusion of social actors in political decision-making processes and, therefore, influence state-society relationships. Both chapters outline that state-society relationships influence the level of resilience and how government levels can contribute to the level of resilience. This chapter will focus on the analysis of the level of resilience of the city of São Paulo and its inhabitants during the drought of 2014-2015. It will first outline the social and political triggers and consequences of the drought. After that, it will outline the possible environmental degradation processes that could have contributed to the drought.

This thesis argues that the components of the system, both the government and civil society, were given the opportunity to point out, target and decrease their particular vision of vulnerabilities that the drought had exposed. The drought of 2014-2015 pointed out that vulnerabilities were seen in different socio-ecological contexts. Therefore, these vulnerabilities will be targeted differently according to the different visions of the city that each actor has, as was outlined on p.10, drawing on Pelling (2011). Looking at the line of actions executed in São Paulo during the drought, this thesis points out the lack of inclusion of civil society actors in the political decision-making processes as well as the hardly existing cooperation between the components. The thesis argues that this disconnection within the relationship between government and civil society actors can be damaging for the level of resilience. It defines how and to what extent social actors are able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard.

6.1. Social and Political Triggers and Consequences

The industrialization processes that happened in Brazil, mainly covering the provinces of São Paulo, Rio de Janeiro and Minas Gerais, caused a fast increase in economic growth and profits. In the case of the Metropolitan Region of São Paulo (SPMR), and specifically the city of São Paulo, this triggered a fast increase in population growth due to the arrival of millions of people seeking for work (Kelman and Porto, 2016). Over the past few decades, the population growth increased to over 20 million inhabitants in 2016 and is most likely to increase even further (Cambareri, 2017). Together with the growing population also comes dynamics in urbanization processes such as the demand for housing, infrastructure, sanitation, electricity, water and the availability of urban services like hospitals and schools (Jacobi, 2001). However, due to the fact that the city of São Paulo grew rapidly over the past few decades, it was shown that it was not capable of dealing with these dynamics in a sustainable way. The already segregated society, due to historical political, social and economic processes as described in the previous chapters, became even more segregated due to inequality differences with regard to access to social and urban services as well as economic opportunities (Jacobi, 2001).

6.1.1. Informal Settlements versus City Centre

The extent of these inequality differences became even more visible when people were differently affected by water shortages due to the 2014-2015 drought. Besides the fact that this was shaped by state-society relationships in the historical political development, another reason was the issue of housing. The demand for houses rises at the same pace as the amount of inhabitants living in the city of São Paulo. However, the population grows faster than the city is able to provide houses, causing a lower supply of houses than the needed demand. This resulted in the occurrence of forms of

unorganized urbanization, also known as informal settlements, around the 'regular' city of São Paulo (Braga and Kelman, 2016). Over the years, the expansion of informal settlements became bigger but the construction of urban- and water infrastructure to these places grew in a slower pace (Jacobi, 2001; Braga and Kelman, 2016; Cambareri, 2017). The lack of urban infrastructure was also experienced by myself when I tried to travel to one of the slums just outside the city of São Paulo: not only would it take a couple of hours to arrive there but I could only travel by bus. The last bus from São Paulo to the slums would go early in the evening and it would be even more difficult to travel back to the city centre. Whereas public transport in the 'regular' city of São Paulo consists of metros and buses, is fast, starts early in the morning and ends at midnight.

When it comes to the infrastructure, distribution and access of water during and after the 2014-2015 drought, the people living in the informal settlements have different experiences compared to the people living in the city centre. The water company responsible for the distribution of water in the formal settlements of São Paulo is SABESP: *Companhia de Saneamento Básico do Estado de São Paulo*. Meaning that all the households that are located in the city centre have meters in their homes that regulate the water distribution (Kelman, 2015; Braga and Kelman, 2016). This also meant that, during the drought, these households had access to water. Depending on the place in the city where these households are located, one could have access to water all day or just a couple of hours a day. As one of my informants, living in the business area, mentioned (Interview Local-2):

> "*The thing that happened is that SABESP only gives water by night, during the drought: by midnight to 6AM. (…) To be honest, I really think that we sometimes ran out of water during the drought. But we have this storage system [in the apartment building] that grasps the water and store it and then it got distributed during the day. That is why we feel that we were never without any water or that we were having water shortages*".

Other informants that are living in apartment buildings in the formal urbanized area of São Paulo mentioned the same statement (Interview Local-1; Interview Local-3; Interview Local-4). However, households living in the same apartment building collectively pay for their monthly water bill. When it comes to having continuous access to water during the drought, one might need to consider to save or reuse water. Unfortunately, what was mentioned by a few of the informants is that even though they might be trying to save water, other people in their apartment building might not do the same thing. Still, they are paying the same amount of money per month (Interview Local-1; Interview Local-3; Interview Local-4). On the other hand, people that are living in houses individually pay for their water bill. The only visible difference mentioned is that, before the drought, people had access to water by opening their taps. Whereas during and after the drought, people who were living in houses in the city centre of São Paulo bought water storage tanks (*caixa da água*) to save and store water in times of need (Interview Local-1; Interview Local-3).

Water storage tanks (caixa da água) on top of apartment buildings and houses in Vila Clementino, São Paulo (2018).

As the thesis has mentioned before, SABESP only distributes water to the formal settlements of São Paulo. All of the informal settlements that are located around the city do not legally have access to the water distribution system (Kelman, 2015; Braga and Kelman, 2016). Still, the households of the informal settlements have access to the water distribution system due to the fact that the water pipes are leaking. This gives the people the opportunity to catch – or illegally tap – and use the water in several ways (Kelman, 2015; Braga and Kelman, 2016; Cambareri, 2017). However, some households were having legal access to the water distribution system but they faced a tougher time during the drought of 2014-2015 compared to the people from the city centre (Interview Local-5):

> "*As soon as the drought began, we quickly realised that because we did not have any water during the night. The water would stop coming really soon during the day and the pressure was really low. There were times where I would not get any water after 4PM. Everything that I needed to do, I had to do before 4PM. Or I had to store the water elsewhere because I did not have a water tank at my place. So things were tougher because of that. My whole life, and others, was based around the water schedules*".

The reason why the informal settlements are the first to experience water shortages is because they are 'last in line' when it comes the access to water. Most businesses and companies that are responsible for the economic growth and profits are located in the centre of São Paulo. Hence, they are the first ones who have access to the water. After that, the water is pumped through the rest of the city centre and, lastly, it is pumped to the informal settlements (Interview Local-2; Interview Local-5). This is especially interesting considering the fact that most informal settlements are located nearby water reservoir systems such as the Cantareira, Guarapiranga and Billings (Interview Local-5).

6.1.2. Structural and Non-Structural Measures

Despite the effect of the water shortages and the experiences different groups of people had during the drought of 2014-2015, both the government and the population of São Paulo needed to invest in solutions to control the severity of the water crisis. However, according to the respondent during the fieldwork in São Paulo and different scientists, the government failed to act sooner. Due to upcoming elections that were held in the year of the drought, they were accused of avoiding the topic of the water crisis and denying the severity of the crisis in order to not lose votes (Escobar, 2015; Buurman,

Mens and Dahm, 2017; Cambareri, 2017). Still, they implemented both structural and non-structural measures to tackle the severity of the water crisis (Braga and Kelman, 2016).

Structural Measures

Structural measures mainly focussed on the water infrastructure. During previous droughts, the main solution was always to build bigger reservoirs in order to store more water (Cambareri, 2017). During the drought of 2014-2015, this was no different. The water reservoirs were going to be rebuilt in order to capture more water. For them to capture more water, the amount of water infrastructure needed to be increased. Different water reservoir systems were interlinked and interconnected via the construction of new water pipelines. Next to this, the construction of new water pipelines was also used to connect the water reservoir systems with other rivers that are either close-by São Paulo or far away. In this way, the amount of water that can be extracted from different sources will be bigger (Braga and Kelman, 2016; Buurman et al., 2017). This can result in more certainty over the access to water for the city centre and the informal settlements of São Paulo. The main reason of making everything more interlinked and interconnected is due to the fact that the government of São Paulo wanted to prevent another water crisis where half of the population of the city is relying on one water reservoir system – which was the Cantareira system in 2014-2015. By interconnecting the systems, the chance of running out of water would be smaller (Coelho, Cardoso and Firpo, 2015; Cambareri, 2017). Next to this, pumping systems were installed in order to get water from the dead storage – which is water located at the bottom of the water reservoir system that is stored for emergency situations (ANA, 2014; Coelho et al., 2015).

One structural measure was already implemented decades before the drought of 2014-2015. However, it received new attention due to the severity of the water crisis: the treatment of wastewater and sewage water (Braga and Kelman, 2016). Even though all the previous mentioned structural measures might be relevant at the time of the crisis, being prepared for future crises is even better. One can transfer all the water from all the reservoirs to all the areas of São Paulo but if the water is not being treated, one cannot use it in the future anymore (Kelman, 2015). This is especially of importance because industries and companies are dumping their sewage consisting of pesticides and other chemicals in the water – which is used for drinking purposes. Unfortunately, the treatment of sewage water and wastewater did not receive as much attention as the other structural measures. Mostly because the population of São Paulo needed to be aware of the importance of this structural measure and, in the end, this was not achieved (Braga and Kelman, 2016).

Non-Structural Measures

Non-structural measures focussed on the participation of the population to control the severity of the crisis, were also implemented. The most important part of these measures was to increase the awareness of the severity of the crisis among the population. This has been done through the use of media such as television, radio and social media but also by using pamphlets in public places (Braga and Kelman, 2016; Interview Local-2, 2018). In this way, people could think about how they were using water and in what ways they could either save or reuse water (ANA, 2014). However, this non-structural measure could be improved. As one of my informants noted is that the culture of Brazilian people is to see water as a product and not as a resource. Therefore, there is no awareness among the population that water is an ending product and that this needs to be handled with care (Interview Local-1; Interview Local-2; Interview Local-4). A method for increasing the awareness of

the severity of the crisis has been done through the use of economic instruments. SABESP tried to make people aware of the severity of the water crisis by giving discounts on water bills when people would reduce their water use and giving them fines when they increased their water consumption (Escobar, 2015; Braga and Kelman, 2016, Cambareri, 2017). This, together with the structural measure of reducing the water pressure, had the effect that people started to reuse water and became more aware of the water crisis (IEE, 2015).

Reducing the water pressure in the water pipes was another non-structural measure. This had a couple of consequences. First of all, by reducing the pressure in the water pipes, leakages were reduced (Kelman, 2015; Braga and Kelman, 2016). This affected the population living in the informal settlements and who had no legal access to the water distribution system (Cambareri, 2017). Secondly, the water pressure was used for rationing purposes. Meaning that different parts of the city of São Paulo had access to water on different times during the day (Langlois, 2014; Rigby, 2015). This could mean that some households had access to water for a couple of hours during the day and others had access only during the night. However, for the people that were living in the informal settlements, this could mean that they would go without water for more than a couple of days as the water pressure would further decrease (Interview Local-2). The drought became even worse at one moment resulting in social groups in informal settlements that were living without water for more than a week (Interview Local-5). In order to deal with this, water tanks would be filled and buckets full of water would be stored all over the place. Instead of using drinking water, they used rainwater for activities that not needed clean water – such as watering crops and cleaning.

6.1.3. Post-Drought Consequences

After the drought, the water infrastructure that was set in motion still needs to be finished and most of the non-structural measures were stopped after the crisis of 2014-2015. However, the population of São Paulo can still receive fines when they are overusing on their water consumption. Especially since population growth increased after the crisis and, therefore, the demand for water also became higher (Nobre et al., 2016). When it comes to access to water after the drought of 2014-2015, one informant told me that most of the population of São Paulo does not trust the water that the government and SABESP is providing via the taps. The water would be either brown or it would have a very chemical smell. People who would have the resources would buy filters in order to separate the chemicals from the drinking water (Interview Local-2). However, not everybody has the resources to buy such filters or to have constant access to water after the drought (Interview Local-5):

> "*In my area and in other places of the outskirts, we feel that the pressure was never the same again [after the drought]. Even today, when it is 11PM, the pressure is low and it is never the same as it was before*".

Therefore, people – especially in informal settlements – bought water storage tanks during and after the drought of 2014-2015. They know that things will get particular difficult in their situation and they were preparing for the worst and what is yet to come (Interview Local-4). Social and political decisions upon the issue of the distribution and access of water are playing an important part when it comes to the severity of the water crisis. The impact of these decisions can be derived from state-society relationships and to what extent social groups can participate in political decision-making processes that affect their local socio-ecological situation. This thesis showed that the historical

state-society relationships, where marginalized social groups were excluded from democratization processes, still impact the distribution of resources in the present day in São Paulo. It are still the marginalized social groups who have less access to resources such as water and who are less capable of mobilizing and organizing themselves in the case of a natural event. Since the marginalized people who are living in the informal settlements are not legally recognized by the sanitation company as part of the city of São Paulo – something that is not refuted by the municipal and state government, the thesis points out that there is a disconnection within the relationship between government and civil society. This is considered as damaging for the level of resilience of marginalized social groups in São Paulo.

6.2 Environmental Degradation Processes

Historically, São Paulo experienced several droughts before the drought of 2014-2015: from 1953 to 1954, from 1962 to 1963, from 1970 to 1971 and from 2003-2004. During every period of time, the amount of rainfall was lower than usual – and became even lower during every dry period – and the temperatures were rising (Nobre et al., 2016). This resulted in water shortages and the adaption of water reservoir systems in order to meet the demand of water of the population of São Paulo. The drought of 1953-1954 even triggered the establishment of the Cantareira system: a system that should provide enough water for São Paulo during crises (Otto et al., 2015). Still, the drought of 2014-2015 was the most severe drought in São Paulo in history when it comes in terms of highest temperatures and lowest amount of rainfall. Combining these abnormalities with a fast-increasing population growth that demands more water, can only lead to extreme circumstances (Coelho, Cardoso and Firpo, 2015; Otto et al., 2015; Nobre et al., 2016).

6.2.1. Rainfall Precipitation

Under normal circumstances, São Paulo is experiencing its wet period in the months December-January-February-March and its dry period in the months June-July-August (Coelho et al., 2015). Normally, the rain that would fall during the wet period would be enough to supply the SPMR and the city centre of São Paulo with water over the dry period. In the case of the drought of 2014-2015, as is shown in figure 5, the rainfall precipitation in the year 2013 was extremely low compared to other droughts and dry periods, such as in 1962-1963 and 1970-1971, whereas temperatures were higher than usual. Only in 2001, the rainfall precipitation is just almost as dangerously low as in 2013. It can also be argued that the drought of 2014-2015 already started in 2011 when the rainfall precipitation rate decreased as well (Coelho et al., 2015; Watts, 2017).

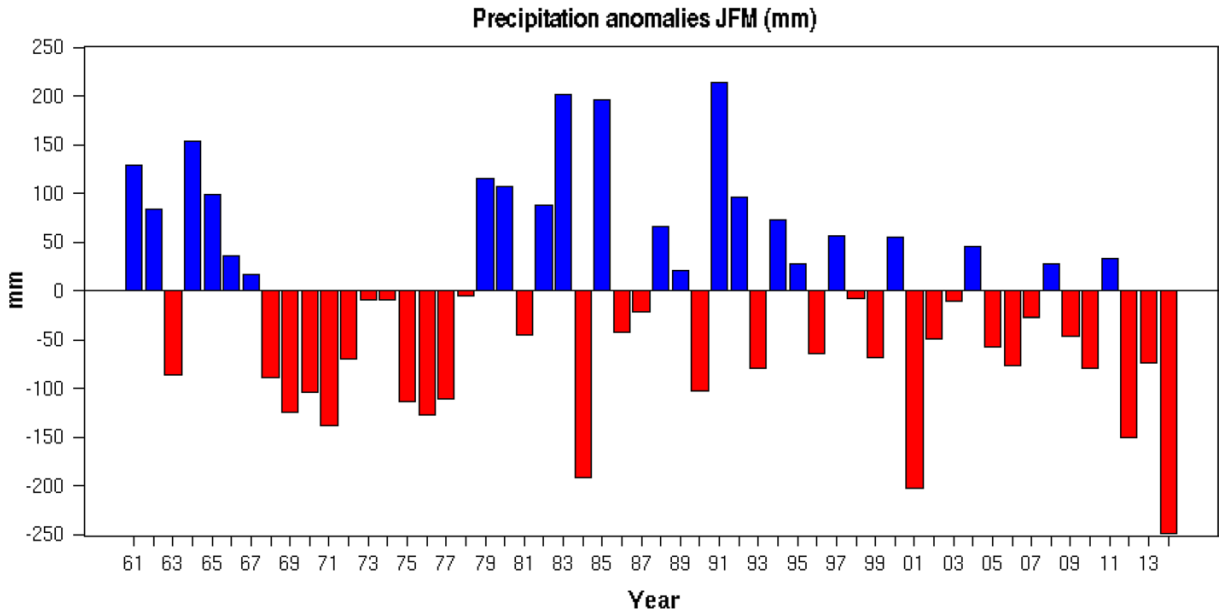

Figure 5 - Rainfall precipitation during the wet period (Coelho et al., 2015, p.3740)

When we look at figure 6 – which shows the monthly rainfall from October 2012 till July 2015, one can notice that the supposedly wet periods of 2013 and 2014 are extremely dry compared to the wet period of 2012. The low amount of rainfall impacted the storage capacity of the different water reservoir systems serving São Paulo. The lower the amount of rainfall, the less water would be available to cover the dry period of that year – which determines the severity of the water crisis for that year. In February 2015, the rainfall precipitation went back to normal (Coelho et al., 2015). However, the rainfall that fell in the months after did fill the water reservoir systems to some extent but it did not cover for all the damage that had been made for the months before.

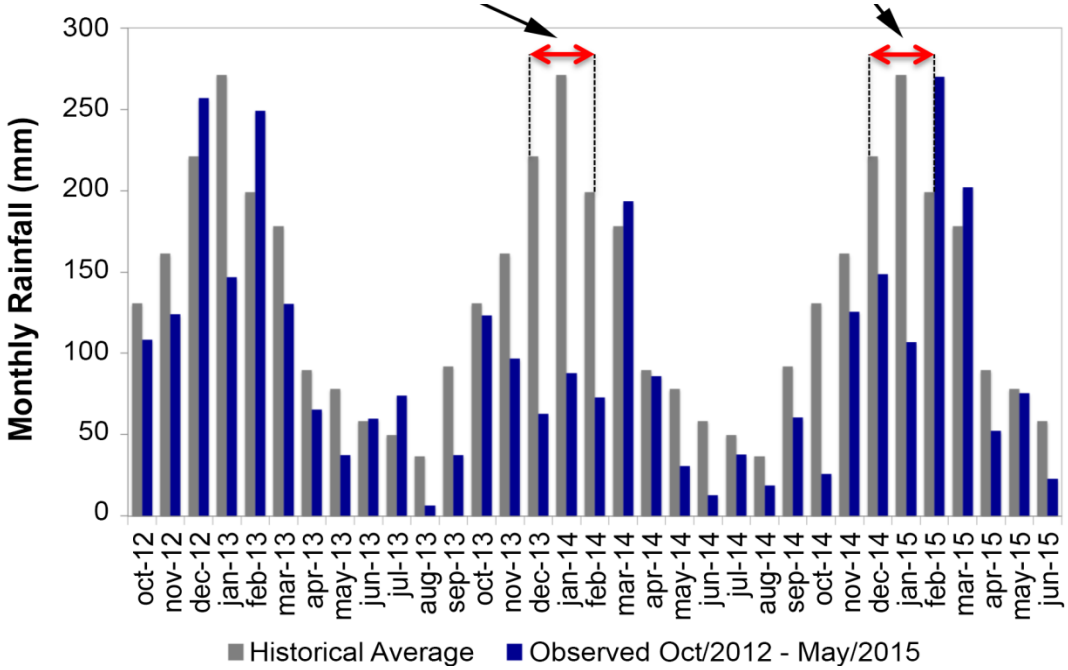

Figure 6 – Rainfall precipitation from 2012-2015 (Nobre et al., 2016, p.285)

6.2.2. Environmental Factors

Depending upon different points of view, there are several environmental factors that can explain the decrease in rainfall precipitation. It has to be noted that the severity of the crisis is not solely caused by environmental factors; human factors might also play a role. However, acknowledging the processes of climate change and the impact they have upon environmental crises is important.

Deforestation Processes

Brazil is known as the country that has both the highest coverage of (tropical rain)forests and the highest rate of deforestation processes (Dobrovolksi and Rattis, 2015). Changes in the total amount of (tropical rain)forest can influence rainfall variability as well as temperatures. A decrease in rainfall and an increase in temperature will, therefore, influence water availability (Nobre et al., 2016). Therefore, most environmental scientists have argued, from a meteorological point of view, that the occurrence of the 2014-2015 drought was intensified by processes of deforestation in (tropical rain)forests such as the Amazon or Cerrado (Nazareno and Laurance, 2015). These big forests can influence the amount and the movement of water (Watts, 2017). When there are no human influences in such areas, the forests are producing and reusing the water for its own biosphere. When human impact – such as deforestation processes or the building of houses – comes in the picture, these producing and reusing processes are changing. This can cause environmental changes such as differences in rainfall precipitation and temperatures (Sills, 2015).

On the other side of the perspective there are scientists that believe that it is unusual to say that, for example, the Amazon is influencing the rainfall precipitation in São Paulo (Interview Coutinho, 2018). Although deforestation processes need to be taken into account and can indeed influence rainfall precipitation and temperatures, it might be better to look at these processes closer to the region of São Paulo. The Cerrado, for example, also has a high rate of deforestation processes – almost 50% of its total surface has already been destroyed. One might also look at the Atlantic Forest close to the water reservoir system of São Paulo. Due to the fact that these areas are closer to São Paulo, it might have a bigger effect upon rainfall precipitation and temperatures than the Amazon might have (Dobrovolksi and Rattis, 2015; Interview Coutinho, 2018).

The South-Atlantic Convergence Zone

Another important environmental factor that highly influences the degree of rainfall precipitation is the South Atlantic Convergence Zone (SACZ). This is a regional system that starts in the northwest part of Brazil – including the Amazon – and crosses the southeast corner of Brazil during the wet period, influencing the rainfall precipitation in the provinces of São Paulo, Rio de Janeiro, Espírito Santo and Minas Gerais (Coelho et al., 2015; Nobre et al., 2016). During the drought of 2014-2015, the numbers of SACZ crossing the SPMR and the city of São Paulo were significantly less during those years compared to other years. According to the scientists who researched this phenomenon, there were blocking systems present over the region of São Paulo during this period of time. These systems blocked the rainfall over this region during the drought (Otto et al., 2015; Nobre et al., 2016). This resulted in a reduction of the amount of rainfall leading to less water storage in the reservoir systems. Besides this, the temperatures in the SPMR and the city of São Paulo increased as well. The water that was stored in the reservoir system evaporated due to the heat.

'Urban Heat Island'

The severity of the crisis is not solely based on changes in the environmental factors. Human impacts and influences are just as important when it comes to the severity of the crisis. An interesting point of view upon the topic of the drought of 2014-2015, while combining both environmental and human factors, has been given by the Brazilian movie 'Volume Vivo' (2015):

> *"The city of São Paulo was built in the middle of what was formerly the Atlantic Forest. So we cut down the forest and we replace it with cement and asphalt. This totally changes the conditions of the temperature and humidity inside the city to the point that during some hours of the day, the difference in temperature between the centre of the city and the periphery can be 45 degrees. It configures what we call the 'Urban Heat Island.' Because there is the cement and the asphalt that become very hot and this exists in an environment with much less humidity and forests. Because we do not have vegetation, the result is that in São Paulo in the last decades the rainfall frequency increased to extremes. The last 40, 50 years, the rainfall intensified and has become much more frequent and this should increase during the next years as well".*

There are two sides of the story, as Volume Vivo argues. On the one hand there are human and environmental factors that are decreasing the rainfall frequency. Deforestation processes, the absence of the SACZ and the construction of urban- and water infrastructure have an effect on the increase in temperature. Therefore, the rainfall frequency is lower as well. On the other hand, the same human and environmental factors are also responsible for the extreme rainfall. Meaning that when it is dry, it is very dry and when it rains, it rains a lot. This makes it difficult to anticipate on these situations. Instead of having a regular flow of rain during the wet periods, the extreme rainfall can come after those wet periods instead (Volume Vivo, 2015).

Even though it is not only human influences that had a major contribution to the severity of the crisis, humans can still make an effort to turn the cycle around. By stopping deforestation processes or constructing new forests, by treating wastewater and sewage water and making protocols for dumping sewage in rivers and water reservoir systems, the population of São Paulo can decrease the effects of climate change or the effect of 'Urban Heat Island' on the environment. Therefore, the environmental, social and political systems are indissoluble and interlinked when it comes to increasing the level of resilience. However, during the drought of 2014-2015, the narrative of the government of São Paulo was that the drought occurred solely because of climate change. According to the government, there was no drought at all. Of course, climate change and environmental degradation processes are important factors when it comes to the shocks of socio-ecological contexts but social and political systems play a role as well.

6.3. Conclusion

The long history of political course towards the governing and managing of the current Republic of Brazil as well as the implementation of democratization and decentralization processes, shaped the socio-ecological context of São Paulo at the time of the drought in 2014-2015. Even though environmental processes are considered to be an important factor in the occurrence of the drought, the political and social systems present in São Paulo and Brazil are important as well.

This thesis point out that a disconnection within the relationship between government and civil society actors have been present at the time of the drought in São Paulo. During the drought in 2014-2015, the government of São Paulo made the centralized decision to handle the drought in a top-down manner. This was shown to be damaging for the level of resilience since government actors were not distributing the information to the civil society actors that a drought was arriving. Therefore, social actors were less able to anticipate, reduce the impact of, cope with and recover from the effects of the drought in 2014-2015. This thesis indicates that the relationships between the government and civil society actors are important and that both components need to cooperate in order to increase the level of resilience. Looking at the line of actions executed during the drought, this thesis points out the lack of inclusion of civil society actors in the political decision-making processes as well as the hardly existing cooperation between the components. When there is no cooperation between the two components, both actors will point out, target and decrease their particular vision of vulnerabilities within a particular local socio-ecological context in São Paulo. The next chapter will, therefore, show how the disconnection within the relationship between government and civil society actors is put in practice with regard to urban water management in São Paulo.

7. Urban Water Management in São Paulo, Brazil

The previous chapter showed how state-society relationships shaped the socio-ecological context in São Paulo at the time of the drought in 2014-2015. It showed that there was a lack of inclusion of civil society actors in the political decision-making processes as the government of São Paulo made a centralized decision to handle the drought. The disconnection within the relationship between government and civil society actors can be damaging for the level of resilience. This can also be seen with regard to urban water management. This chapter will outline the different parts of urban water management in São Paulo, Brazil. It will start by analysing the water management by the government and civil society. After that, the chapter will continue by outlining the importance of privatization processes and private companies and businesses with regard to water management. The chapter will end by pointing out the importance of sanitation and sewage treatment systems.

This thesis argues that government and civil society are needed for managing the water. Therefore, social actors need to be included in political decision-making processes to influence policies made on a government level. However, in the case study of São Paulo, there is a lack of inclusion of civil society actors in democratization and decentralization processes during the drought in 2014-2015. Therefore, the importance of the actions done by social actors itself to increase the level of resilience in their local socio-ecological context is also considered as a key point. The actions can also be aimed at pointing out, targeting and decreasing particular visions of vulnerabilities in a particular local socio-ecological context. It needs to be pointed out that both government and civil society actors will argue for different practices in order to strengthen resilience according to their own perceptions and visions of the city of São Paulo.

7.1. Urban Water Management in São Paulo, Brazil

Looking at the established and implemented federal and state laws regarding water governance and water management, it might politically be argued that the water infrastructure in São Paulo is almost close to perfect. Especially when it comes to mind that São Paulo experienced a frequent amount of droughts in the past. Therefore, it had the opportunity to learn from past experiences in order to improve its water infrastructure and secure the availability of clean drinking water. Especially after the drought of 2003-2004, governor Geraldo Alckmin and the sanitation company of São Paulo, SABESP, promised a new, integrated connection between the different water reservoir systems. Distant water resources would be connected to the water reservoirs of São Paulo. In this way, the argument was that there would always be enough water to support the local population in times of crisis. Even though that a crisis like the 2003-2004 drought would never happen again, according to their opinion. However, the implementation of this plan never happened (Cohen, 2016; Jacobi et al., 2017). Mainly because Alckmin blamed the drought on climate change and environmental factors such as the rainfall precipitation instead of management issues (Jacobi, Fracalanza and Empinotti, 2017). However, a more severe drought came in 2014-2015. The narrative of climate change was used again and management issues were left aside (O Escândalo da SABESP, 2015).

7.1.1. Urban Water Management by the Government

As has been mentioned before, the 2014-2015 drought was considered the most severe drought of all times. With the implementation of the State Water Policy in São Paulo, the opportunity during 2014-2015 of dealing with the drought via decentralization and participatory processes came to the fore. Unfortunately, the decisions made with regard to emergency measures to diminish the severity

of the drought were centralized. Therefore, it was undermining the implementation of the National Water Act and the State Water Policy with regard to decentralization and participatory processes (Interview Fracalanza, 2018):

> "*The decision was centralized: it did not work with the hydric basin committees, it did not work with the participation of civil society. How could social movements and society and all the other movements participate? They could not really participate because the government closed all the data, they closed the communication. All the politicians and all the decisions made were not consulted with civil society. They did not pass automatically in the hydric basin committees. And this is the problem: all the movements try to participate but it is very difficult. It is difficult because we are now in a non-democratic process*".

The centralization of the decisions were made due to the elections in October 2014. The governor at the time, which is the same governor nowadays, denied the severity of the drought in order to get votes and to be re-elected. When Alckmin was re-elected in 2014, he admitted that there was a crisis and that measures were taken (Victor et al., 2015; Jacobi et al., 2017). However, at that time the drought was already going on for at least one year and the measures that were taken came too late. One of the measures taken was the rationing. Meaning that each area in São Paulo had access to water for several hours per day. However, as has been mentioned before, this affected the poorest population the most. The water pressure became very low at the end of the water infrastructure – leaving them, sometimes, with days without water (Cohen, 2016; Interview Local-5, 2018). Another measure was the construction of water infrastructure, connecting different water reservoirs. However, this created a massive environmental impact as Da Silva said in Volume Vivo (2015):

> "*Given the speed with which they are working, we know that they are having problems with permits; it is a fact. They are not concerned, they are racing against the clock to create the largest possible impact, saying 'it is broken, just leave it, the harm has already been done, so let's just continue'. Instead of sitting down for a discussion within the river basin, with its population, discussing the licenses, taking the time to have a dialogue about what needs to be done within the basin*".

Nowadays, the government of São Paulo and SABESP are working hard to connect all the water reservoirs around São Paulo. They are also building water infrastructure that are drawing water from distant resources. Although one might argue that the construction of this infrastructure is helping to secure the access of clean drinking water to the population of São Paulo, it might also be argued that this has a permanent, damaging impact on the environment (Volume Vivo, 2015). When looking at increasing the resilience of São Paulo with regard to future droughts, this thesis argues that water infrastructure systems – when not properly discussed in participatory processes and not properly adjusted to the environment – will be damaging on the long-term. Therefore, it will not help to create a sustainable environment. It will also not help increasing its long-term resilience. The interconnected water reservoir systems are a temporarily solution. Meaning that they can indeed help to secure the amount of water available but that, in the long-term, other measures need to be taken as well. At one point, there are no water river basins that can be connected to the system. But the demand for clean drinking water will exist.

According to an interview held with SABESP (2018), they are aware of this issue. Therefore, they are trying to change the situation by talking to the local population on the street about the access and consumption of water and how this could be improved. However, changes made by SABESP are not really shown as they continue with what they have always been doing when a drought stops: continue the situation as it was before the drought and not further implying promised solutions, such as better water infrastructure and sanitation and sewage treatment systems.

7.1.2. Urban Water Management by Civil Society

As history has shown and as this thesis has been mentioned before, the implementation of laws, rules and regulations can differ in practice. This is the same for water governance and water management. Relying on the government to do their part with regard to managing the water is one thing. However, different social groups know already that they have to take action by themselves in order to secure their access of clean drinking water. Therefore, there is a need to look at alternative sources of water and use of water in order to increase the access of clean drinking water (Mello and Randhir, 2018). By using different sources of water for activities where clean drinking water is not necessary to use, resilience on the long-term can be strengthened. During natural hazards, the amount of clean drinking water will be higher and the impact of a natural hazard will be diminished.

One of the alternative uses of water sources is the re-use of clean drinking water or the use of rainwater for purposes where clean drinking water is not necessary. These management systems can reduce the water consumption of clean drinking water by more than 40% (Volume Vivo, 2015). When, for example, water is used for washing purposes, the water can be catched and used for other cleaning purposes (Interview Local-3, 2018). Rainwater can be used for harvesting crops or other outdoor activities (Interview Local-5, 2018). However, Volume Vivo (2015) mentioned that collecting rainwater is not really encouraged. The government of São Paulo is afraid that social groups living in the informal settlements are catching the rainwater for drinking purposes. This is due to the fact that these population groups can be without water for days due to rationing. However, drinking rainwater can have consequences for the health of people (Volume Vivo, 2015). Although the government is not encouraging the better management of using rainwater, they are also not pursuing better water infrastructure that connects the informal settlements to the distribution system of water.

Another alternative is the mapping of creeks and springs of small rivers that are existing in São Paulo. Visoni, interviewed by Volume Vivo (2015) mentioned that there are quite a lot of small creeks existing in São Paulo. Some of them are underground and other ones are hidden in the forests surrounding São Paulo. These creeks are already used by the local population for watering their crops, for small agricultural production and the forth. However, these creeks and springs need to be mapped because, as she mentioned: we are going to need this water.

7.2. Sanitation and Sewage Treatment Systems

This thesis argues that a good functioning sanitation and sewage treatment system is important. These systems are able to ensure safe and clean drinking water and can, therefore, contribute to the level of resilience. When looking at the amount of inhabitants in the Metropolitan Region of São Paulo combined with the amount of industrial and agricultural companies and businesses, the region produces a lot of waste. It is, therefore, not more than logical that São Paulo has a good working and functioning system that treats and cleans the water, distributes it to the inhabitants of its region and contributes to the availability of clean drinking water. Unfortunately, this is not the case.

In São Paulo, the sanitation and sewage treatment systems are managed by SABESP (Victor et al., 2015). In a report of the World Bank (2014) that focussed on Brazil, it is noted that in 2011 only 52.5% sewage was collected and only 34% of this was treated. This is also argued by Victor et al. (2015). They also note that only 40-45% of the households of Brazil are connected to the sanitation and sewage systems. According to their data, they substantiate the finding that water management in São Paulo is better than in any other state of Brazil. Data that was collected in 2012 argued that 82% of the households of São Paulo were connected to the sanitation and sewage systems and that 99% of the inhabitants had access to clean drinking water (World Bank, 2012; Victor et al., 2015). However, with an interview with the sanitation company of the city of São Paulo, SABESP (2018), they argued that 100% of the inhabitants of the city had access to clean drinking water and that 65% of the collected water was treated. They left, however, in the middle how much sewage water was in fact collected.

When it comes to the numbers of the amount of inhabitants that are connected to the sanitation and sewage treatment systems, the amount of sewage that is actual treated and the amount of inhabitants that have access to clean drinking water, there is no clear answer: the numbers are too divergent. Next to this, the social groups living in the informal settlements are left out of this data. This is due to the fact that people living in these areas are, legally, not part of the city of São Paulo and are, therefore, not legally connected to the sanitation systems. Adequate sanitation and sewage systems are most of the time lacking (World Bank, 2012; Victor et al., 2015). However, what can be argued on the basis of the numbers of the data is that the sanitation and sewage treatment systems in São Paulo are underdeveloped. The amount of sewage collected is much higher than the amount of sewage treated, cleaned and distributed.

7.2.1. Privatization and Informal Settlements

There are two sides in the ongoing debate of who is creating the most sewage and who is polluting the water the most. First of all, civil society actors are blaming the water pollution on industrial companies and businesses. Under the National Water Act of 1988, industries are allowed to dump a particular amount of waste in the waterways according to the permits that they have been given (Kelman and Porto, 2000; Victor et al., 2015). Due to the fact that industries are not heavily controlled, there is a big chance that industries are dumping more than their permits or even without having a permit. Another chance is that they are dumping heavy chemicals and pesticides in the water – which are hard to get out of the water with treatment. However, due to the known constraints in the water infrastructure, the quality of water and the access to clean drinking water is further compromised when industries are dumping more than their permits. Still, these statements cannot be proven or are very hard to prove.

Due to the globalization processes in the 1980s and ongoing, international private companies and businesses were rising and were settling around the world. Political structures and state-society relationships changed due to the transformation towards a politicized, democratic state. Economic and social structures were changed as well due to the exchange and distribution of resources, knowledge, expertise and technology (Pomeroy, 2016). However, with the arrival of the international private companies and businesses also came another issue: the divide of the clean drinking water. As the government was economic driven in the 1980s and ongoing, they gave permits to the companies

to freely use their water for the production of goods (Privatizações, 2014; O Escândalo do SABESP, 2015). However, these permits were not withdrawn during the drought of 2014-2015. Leading to frustration and disbelief by the local population of São Paulo. The local population of São Paulo was instructed to use less water than before. This was promoted with economic incentives: when you reduced the water, you would get a discount on your water bill. If you did not reduce your usage, you would get a fee (Escobar, 2015; Braga and Kelman, 2016, Cambareri, 2017). But the companies and businesses did not need to change anything at all (Interview Local-2, 2018; Interview Local-4, 2018; Interview Local-5, 2018). Interview Local-4 (2018):

> "*On an individual level, and that is why I am angry about it: why do we need to make individual changes? Why do we have to cut our shower shortages and washing the laundry, and reuse the water while companies are not doing anything? They are the big consumers and big responsible ones for the situation. I am angry about that. Because we all have to do our parts*".

According to the local respondents during the fieldwork in São Paulo, they argued that the government should be held accountable for the fact that companies were not reducing their water usage. They argued that the first responsibility of the government should lie with the local population and not with companies – during times of crises (Interview Local-4, 2018; Interview Local-5, 2018). They also pointed out to the government that the permits of dumping wastewater in the waterways were not withdrawn during the crisis. The already present water scarcity was even more affected due to the fact that the little water that was left became polluted.

On the other hand, industries and the parts of the government are blaming the local population living in the informal settlement of contributing to the pollution of water. Due to the fact that there is a lack of water infrastructure in the informal settlements, the population do not have an adequate sanitation system that provides them with the opportunity to dump their waste in an appropriate manner. The collected sewage of the informal settlements is, therefore, dumped in the waterways without proper treatment (World Bank, 2012; Victor et al., 2015). Although this reasoning is familiar in São Paulo, the government and SABESP do not seem to take responsibility by building adequate water infrastructure to collect the sewage (Haglund, 2016).

7.2.2. Adequate Water Infrastructure and Sanitation and Sewage Treatment Systems

Both sides of the debate are contributing to the pollution of water. This resulted in the heavily polluted water reservoirs of Guarapiranga, Pinheiros and Billings. Although the amount of water in these reservoir systems can be enough to solve water scarcity, the water in these reservoir systems can hardly be used due to water pollution (Braga Jr., 2000; World Bank, 2012; Silva-Sánchez and Jacobi, 2013; Cohen, 2016; Jacobi et al., 2017). Another major vulnerability in this debate is the adequate water infrastructure and the sanitation and sewage treatment itself (Victor et al., 2015). In terms of short-term and long-term resilience, this thesis argues that the water infrastructure needs to be improved. Meaning that leakages need to be diminished as well as the potential pollution in the pipes (Mello and Randhir, 2018). The water infrastructure should also be built in the informal settlements. In this way, these social groups are connected to the sanitation and sewage system. By doing this, the risk of unwanted pollution by dumping waste in the waterways and not being able to treat this water is reduced as well.

This thesis also argues that the sanitation and sewage treatment systems need to be improved and the amount of treatment systems need to be expanded. The current situation shows that São Paulo cannot handle the amount of wastewater that needs to be cleaned compared to the amount of water that is used by its inhabitants. The demand for clean drinking water is, thus, way higher than its supply. If the sanitation and sewage treatment systems are not improved then, in the long-term, the amount of clean drinking water will be extremely lower than the amount of sewage water. However, the sanitation and sewage treatment systems need to be improved with taking into consideration the environmental context (O Escândalo da SABESP, 2015). If this is not done, the long-term prospects of resilience will be at risk: environmental risks will be higher on the long-term and it will be harder to solve these issues once the environment is affected. All these circumstances together are contributing to the decreasing amount of available clean drinking water to supply São Paulo and, therefore, the extent of the level of resilience.

7.4. Conclusions

Urban water management need to be carefully planned. It is not only about interconnecting water reservoir systems and distributing water from distant sources. These kinds of solutions, as is argued by this thesis, are only 'good' for targeting short-term resilience. However, when not carefully planned in a specific socio-ecological context, the long-term prospects might be affected. Next to this, urban water management entails the actions done by civil society actors. Not solely relying on the actions of the state but pointing out and targeting vulnerabilities by themselves, is a good way to strengthen short-term resilience. Depending on the actions taken, long-term resilience can be strengthened as well.

This thesis argues that government and civil society actors, including private companies and businesses, are needed for managing the water. It points out that government can manage the water through policies and that social actors need to be included in political decision-making processes. If democratization and decentralization processes are implemented and exercised in practice, social actors can participate in the participatory processes and influence policies about urban water management. However, when there is a lack of inclusion of social actors, it is important that social actors are capable of managing the water from their local socio-ecological context. This thesis also points out that private companies and businesses play a role in the access and availability of clean drinking water. In terms of resilience and vulnerability, the different management structures as well as the different actors playing a role in either managing the urban water or contributing to water pollution need to be taken into account. The vulnerabilities within these structures need to be pointed out and targeted according to the particular vision of the local population. Resulting in increasing the level of resilience.

8. Fórum Alternativo Mundial da Água & Fórum Mundial da Água

The thesis argues that resilience is seen as a political process defined by state-society relationships. The previous chapters showed how and to what extent state-society relationships define the level of resilience and to what extent social actors were able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard. It argued that both components of the system, government and civil society, need to be included in political decision-making processes. However, the thesis points out the lack of inclusion of civil society actors in participatory processes in the case of São Paulo. Therefore, it argues that when there is a disconnection within the relationship between government and civil society actors this can be damaging for the level of resilience.

This chapter outlines the importance of repairing the disconnection in state-society relationships by analysing Fórum Alternativo Mundial da Água (FAMA) and Fórum Mundial da Água (FMA) – which I both attended. The thesis points out that it is important that both components of the system, government and civil society actors, work together in order to strengthen the level of resilience. However, FAMA and FMA show that a disconnection in state-society relationships is maintained by both the government and civil society actors. This thesis indicates that different government and social actors will argue for different practices in order to strengthen resilience according to their own perceptions. This disconnection defines to what extent the level of resilience can be reached through political processes defined by state-society relationships in Brazil and São Paulo.

8.1. Fórum Alternativo Mundial da Água

From the 16th of March 2018 till the 22nd of March 2018, Fórum Alternativo Mundial da Água (FAMA) was held in Brasilia, Brazil. The forum was focussed on the topic of water but its theme was 'water is not a commodity'. This was linked to the privatization of water due to the settlement of private companies and businesses that use clean drinking water for the production of goods – which ultimately leads to the decreased availability of clean drinking water for the local population.

At the beginning of the week, I attended several readings and presentations. Multiple stakeholders – including civil society actors, experts and academics – came together in order to exchange different forms of knowledge that can be useful when understanding the topic of 'water' in Brazil. However, it needs to be noted that there were hardly any government actors present during these readings and presentations nor did they attend FAMA in general. As has been mentioned in the chapter of the conceptual framework, this could mean that the knowledge of the government actors was lost in this forum. When looking at the level of resilience, this thesis argues that when knowledge is lost, the extent of strengthening resilience will not be as high as it could be if all actors were included. However, it needs to be noted that due to the deeply rooted power structures in Brazil, social actors might not even have welcomed the knowledge by the government actors. They firmly believe that the government is implementing policies via a top-down manner and is collaborating with private companies and businesses to exploit marginalized social groups and ecological systems for the privatization of water and the economic development of Brazil.

Fórum Alternativo Mundial da Água: Água não é mercadoria (*water is not a commodity*)
It was peaceful when I arrived at the area where FAMA was held. Indigenous groups installed

*themselves behind their tables: ready to sell their products. They were recognizable by their make-up and feather attire. NGOs had mixed themselves among the indigenous movements but were recognizable by their shirts. There were flags everywhere mentioning environmental- and water-related issues (linked to privatization): '*sem água não alimentamos o Brasil' *(without water, no feeding of Brazil); '*a água é do povo*' (the water is of the people); '*levante-se contra a privatização da água*' (stand up against the privatization of water) and '*água não é mercadoria*' (water is not a commodity). The latter one was the theme of FAMA.*

The day was going to be filled with debates; most of them in Portuguese, one of them translated to English. I settled down on one of the many chairs, looked around and waited for the introduction to start as was done usual. However, music started and people were moving the chairs in order to make space. Two giant puppets appeared at either side of the podium and started to move at the pace of the music – which was the sound of an horror movie. They represented President Trump of the United States of America and President Temer of the Republic of Brazil. Two major participants in the privatization of water – as is perceived by the participants of FAMA. It took a long time before these puppets were 'attacked' by the people surrounding the podium. Once the puppets were torn down, the actors came on the stage.

There were screams and sentences were said in Portuguese. You could feel the pain, the frustration, the panic and the incomprehension when a farmer tried to explain to a representative of a company that there was no more water and that they needed water. The farmer pointed to his children, who were laying on the ground. He was saying: "Please, there is no more water. My children need to drink. Please give us some water". The situation quickly escalated when the representative took a gun, shot the children and then the farmer. People were screaming and crying. It was later said to me that this was how they felt when it came to water: the government did not protect them against the private companies and businesses. Instead, they left the marginalized social groups to die while they were making money through the privatization of water.

Box 3. A personal experience during FAMA that featured the theme of the forum.

This example shows that the civil society actors present at FAMA are highly convinced that water is seen as a commodity in the eyes of foreign countries, private companies, businesses and even in the eyes of their own president. In their opinion, these actors would do anything in order to exploit the water. If the lack of water is not killing the local population, than the private companies will do so when social actors are protesting against them.

FAMA was mainly focussed on creating the narrative that everywhere in the world, the lack of water was existing. Representatives of different countries attending this forum were substantiating this narrative. After every story, the message was the same: the exploitation of water resources by private companies is the reason for the lack of access and availability of clean drinking water. An extension of this narrative was that the governments of these countries are not doing anything because they are only focussed on economic development. This thesis does not argue that this narrative is not correct. On the contrary, this narrative can contribute to the awareness of civil society actors with regard to securing water resources such as the mapping of creeks and springs. By securing and protecting water resources, they can increase their resilience with regard to the access of clean drinking water. If these water resources are handled well, the impact of a natural hazard will

be decreased due to the fact that there is also enough clean drinking water in times of droughts. However, pointing out that the government is only governing and managing the water for economic purposes might seem too straightforward. Most of the time the government needs to balance its state-society relationships with its international relationships – such as with the United Nations or other countries – and developing purposes.

An outcome of FAMA was that the management of water should be in the hands of civil society actors without the involvement of the political decision-making processes of the government. They argued that the government should entirely be left out of the management of water. However, this thesis argue that it seemed that the participants of FAMA were not able to see that the government levels and departments are also needed in order to change the management of water. When it comes to managing water in cities such as São Paulo, it is hardly thinkable to leave the management of water in the hands of millions of people. However, the vibe that was felt at FAMA was stubborn – which is understandable. Why should the civil society actors want to include government levels and departments when they were left out of the political decision-making process regarding water for so long? Why should civil society give them the opportunity to have a say in how their water is managed? However, the participants of FAMA need to acknowledge that governing and managing water might not be as easy as it was a century ago. International structures and relationships need to be taken into account. Also, not every social (and marginalized) group wants the same. Therefore, this thesis argues that FAMA needs to understand that you need both civil society and the government in order to come to a solution.

8.2. Fórum Mundial da Água

There is also another side of the story: FMA – which was held from the 18th of March 2018 till the 23rd of March 2018 in Brasilia, Brazil. Where FAMA seemed to not understand the importance of involving both the government and civil society in political decision-making processes regarding water, FMA did not seem to have this problem on paper. In practice, there was a difference. On the one hand I met actors that were regretting the fact that civil society actors were not participating in the international debate on water. They were convinced of the fact that the debate would have been more in-depth and that the solutions were not only top-down. As what I have heard was that NGOs, social movements and marginalized social groups were not part of the debates held in FMA.

Fórum Mundial da Água | The World Water Forum
FMA was a different world compared to FAMA: there was a calm, serene and structured sphere. International and national stakeholders were lined up at different parts of the exposition and fair. Representatives of the government, companies, businesses and NGOs were ready to give you all the information they had and were willing to answer questions. However, these questions should not be too critical. Otherwise, the topic was shifted to a more positive outcome, the stand was 'closing' or people would not be available to answer any questions. Still, everything was focussed on securing the access and availability of clean drinking water. The sharing of knowledge, expertise, data and technologies between all stakeholders turned out, however, to be important.

Box 4. A personal experience during FMA when attending the exposition and fair.

On the other hand, the two forums were at least 30 minutes driving away from each other. It was mentioned that FMA did not want to recognize the existence of civil society actors as they were not included in the international forum. Even more, when attending a protest regarding the privatization

of water, the federal police was present everywhere in order to control the mass of people walking in the streets. They did not use any violence but they also did not protect the people from dangerous situations – which caused an unsafe feeling. However, this can be linked back to the historically shaped state-society relationships. As was mentioned on page 18, the elite groups and the military have always had a strong relationship. The protest in Brasilia was mobilized and organized by left-wing parties that included a large number of marginalized social groups from all over the country. Meaning that elite groups are tried to control the structure of the protest via the military as they are still resistance of left-wing people.

A picture taken by one of the participants of FAMA showing the power differences between government actors and civil society (2018)

This thesis argues that it would have been better when these forums were combined in order to create a dialogue between different stakeholders of the international community, the government levels and departments and civil society actors. The reason that this did not happen is unclear. On the one hand it can be because government actors did not want to be the social actors involved due to reasons that are not clear. On the other hand FAMA showed that they were resistant to the inclusion of government actors. This resulted in state-society relationships and structures that are, at the moment, not on the same page when it comes to the topic of water. However, this thesis argues that this disconnection within the relationship between government and civil society actors can be damaging for the level of resilience and how and to what extent social actors are able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard.

What happened in March 2018 was that the different stakeholders came together in their own forum, discussing the environmental and water-related issues from their own perspective without coming to the solution that both the politicians of Brazil and São Paulo as well as the civil society actors would agree on. This thesis argues that when the two components of the system are not at the same page, the possibility of strengthening resilience in local situation is low. In the end, it will be the government policies that will be implemented in a top-down manner depending on how the city of São Paulo is viewed in their eyes. This results in leaving out the democratization and decentralization processes. However, when there is more inclusion of civil society actors, the level of

resilience can be strengthened because local processes are taken into account when setting up and implementing policies.

8.2 Conclusion

State-society relationships are changing to the current situation in Brazil and São Paulo. This chapter outlines that the state-society relationships in Brazil, and therefore in São Paulo, are disconnected. The government and civil society actors were not participating in one forum to discuss the topic of water and the impact of current practices with regard to water on the local socio-ecological context. Therefore, it is pointed out that there was a lack of inclusion of civil society actors in the political decision-making processes. Throughout the thesis it has been argued that a lack of inclusion of civil society actors in participatory governance is due to the state-society relationships: the government is not including them. However, FAMA showed us that civil society actors are also very resistant to the fact that they need to work with the government in order to overcome the issue of water scarcity. The participants believed that the government was not governing and managing the water in an appropriate manner and that they could best be controlling the waters. As this thesis argues, it is important that social actors are able to act by themselves when it comes to the access and availability of water as well as increasing their level of resilience according to their particular vision in their local socio-ecological context. The previous chapters have showed that they are capable of doing this. However, this thesis also argued that a higher level of resilience can only be achieved when government and civil society are working together. Again: resilience is a political process shaped by state-society relationships.

9. Discussion

With regard to strengthening resilience and decreasing vulnerabilities, a lot of actors are included: the federal government of Brazil, the state government of São Paulo, private companies and businesses, social movements, non-governmental organizations and the local population. All these actors influence the level of resilience and vulnerability. In this chapter, it will be outlined why every chapter was needed for building up towards the argument of the main research question: *How did the drought of 2014-2015 in São Paulo (Brazil) impact upon changes in resilience after the event?*

Resilience, in this thesis and the research it draws on, is seen as a political process defined by state-society relationships. Meaning that the relationships between government and civil society are continuously influencing, adapting to and changing each other in a particular socio-ecological context. In order to understand the level of resilience during and after the drought in 2014-2015, it is important to take these state-society relationships into account. This thesis argues that how and to what extent social actors are able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard is largely determined by the relationships with the government.

In terms of history, Brazil has showed that it continuously shifts between an institutionalized state, a politicized state and everything in between. An institutionalized state, as Chalmers (1977) argues, is a state that sees politics as a routinized decision-making process where the opportunities of the local population to democratically elect its own governing party and president are taken away. Under an institutionalized state, right-wing parties, elite groups and the military are most often in power. They are excluding social groups in democratization and decentralization processes and are ruling the state in a top-down manner. A politicized state, as Chalmers (1977) argues, is a state that sees political decision-making processes, influenced by both the government and civil society, as one of the factors that shape the contexts of the country. Democratization and decentralization processes are considered as important in a politicized state, since it entails the opportunity for all social groups of the society to participate in political decision-making processes. Therefore it is argued that participatory governance processes work best under a politicized state. Under an institutionalized state, there might be the possibility that the governing party or president does not invest in these processes since it is not considered to be high on the political agenda. Whereas these processes are high on the political agenda under a politicized state, as is argued in the thesis.

The argument made is that social actors need to be included in political decision-making processes to influence policies made on a government level. The value of the knowledge of the local situation can be brought into the specification of the setting-up and implementation of policies can contribute to strengthening resilience in short- and long-term prospects. Therefore, this thesis argues that participatory governance and participatory budgeting are tools that can contribute to strengthen resilience by targeting the particular visions of vulnerabilities through policies that were influenced by social actors in participatory processes. However, due to the fact that the Federal Constitution was implemented in 1988 and the National Water Act in 1991, it shows that the historical roots of democratization and decentralization processes were relatively 'new'. Meaning that participatory governance processes had only been supposed to be implemented for a couple of decades – but the implementation of such policies is lacking in Brazil and São Paulo. Therefore, Brazil and São Paulo had not yet experienced a longer period of time where the government and management of the country was stable enough to implement those participatory governance processes and to see fruitful results.

The chapter of 'São Paulo's Post-Drought Analysis' builds further on this historical process by outlining the social, political and environmental factors that influenced the severity of the drought. This thesis argues that the components of the system, both the government and civil society, were given the opportunity to point out, target and decrease their particular vision of vulnerabilities that the drought had exposed. The drought of 2014-2015 pointed out that vulnerabilities were seen in different socio-ecological contexts. Therefore, these vulnerabilities will be targeted differently according to the different visions of the city that each actor has as has been argued by Pelling (2011). Looking at the line of actions executed in São Paulo during the drought, this thesis points out the lack of inclusion of civil society actors in the political decision-making processes as well as the hardly existing cooperation between the components. The thesis argues that this disconnection within the relationship between government and civil society actors can be damaging for the level of resilience. It defines how and to what extent social actors are able to anticipate, reduce the impact of, cope with and recover from the effects of a natural hazard.

The example of Fórum Alternativo Mundial da Água and Fórum Mundial da Água show that the state-society relationships in Brazil and São Paulo are disconnected. The government and civil society actors were not participating in one forum to discuss the topic of water and the impact of current practices with regard to water on the local socio-ecological context. Therefore, it is pointed out that there was a lack of inclusion of civil society actors in the political decision-making processes. However, this thesis argues that it is important to include all social actors in the political decision-making processes in order to achieve the 'highest' level of resilience. However, due to the fact that there is an existing disconnection, the local population of São Paulo have showed to be capable of increasing their level of resilience according to their particular vision in their local socio-ecological context in the chapter that focussed on urban water management. This chapter builds on the argument 'what if'? What if the government decides not to improve the situation? What does civil society needs to do? Actions such as raising awareness by education, reusing water and mapping new sources of water are done. However, it seems that civil society has the same structure as the government: once the threat is over, things return to normal.

However, in the end of this thesis, it is argued that both components need to work together in order to achieve the 'highest' level of resilience. By targeting the vulnerabilities in the specific local situations and focussing on the differences between short- and long-term resilience, São Paulo might be able to improve its water governance and urban water management. Therefore, the level of vulnerability of the city of São Paulo and its inhabitants is decreased and the level of resilience is strengthened. This can be seen as the new starting point when a next drought occurs. Therefore, resilience is an ongoing process and a fixed outcome will never be achieved.

10. Conclusion

When looking at the water governance and urban water management in Brazil and in São Paulo, this thesis argues that a lot of factors need to be included: the federal government of Brazil, the state government of São Paulo, the international community, (international) private companies and businesses, social movements, non-governmental organizations and the local population. All these actors influence if, how and to what extent the access to clean drinking water is affected. In the case study of São Paulo, it is needed to link the access to clean drinking water with the occurrence of the drought of 2014-2015. The influence of these actors upon water resources influences the level of resilience and vulnerability. Therefore, the following main research question has been formulated: *How did the drought of 2014-2015 in São Paulo (Brazil) impact upon changes in resilience after the event?* This main research question has been answered by answering the sub-questions.

The first sub-question that has been formulated was: *What were/are the reasons São Paulo's vulnerability that was exposed during the event, and why should the level of resilience be increased?* The main reason why the vulnerabilities of the city of São Paulo and its inhabitants were exposed was because their resilience level was not high enough to cope with the drought. Some actors, such state agencies like SABESP, might have been able to anticipate on the drought. They had information that pointed out that a drought was arriving. The rest of the social actors, however, were not able to anticipate on the drought since this information was not distributed by SABESP. When particular visions of vulnerabilities in the period before the drought in 2014-2015 were not point out, targeted and decreased, they become those vulnerabilities that are causing the severity of the drought. Not targeting these vulnerabilities means that the ability to reduce the impact of, to cope with and recover from the shocks and stresses from the drought were not increased. In addition to that, the city and its inhabitants were not able to cope with the impacts of the drought. Especially the marginalized social groups that are living in informal settlements have less access to resources to mobilize and organize themselves in case a natural hazard occurs. This can be derived from the historical political processes that constructed the current state-society relationships. For this reason, the level of resilience of the city of São Paulo and its inhabitants should be increased.

The second sub-question was formulated around the government: *Which levels of government were/are most important for building resilience, and how did the different levels of government interact to achieve resilience?* In terms of history, the political course towards the Current Republic of Brazil shaped the starting point of the level of resilience of São Paulo and its inhabitants before the drought of 2014-2015. The thesis argues that participatory governance processes and participatory budgeting programs focussed on including the local population in political decision-making processes regarding water are important to strengthen resilience. The local population can pinpoint the vulnerabilities in a particular local socio-ecological context. Therefore, these vulnerabilities can be targeted in the setting-up and implementation of policies by the state, municipal and local government. However, this thesis argues that the lack of implementation of policies is the main problem. Not implementing policies that are targeting particular visions of vulnerabilities and, therefore, decrease the level of vulnerability is a step backwards towards strengthening resilience. In order to achieve the 'highest' level of resilience, this thesis argues that all components of the system, including government and civil society actors, need to work together in order to achieve short- and long-term resilience. As has been shown in the case study of São Paulo as well as during FAMA and FMA, there is still a disconnection between those components of the system. It is argued that this

can be damaging with regard to the level of resilience. Each component will only pinpoint, target and decrease their particular vision of the vulnerabilities instead of working together.

The third sub-question was formulated around the civil society: *How was/is resilience supported and promoted by civil society in São Paulo?* It can be said that civil society actors – including social movements and non-governmental organizations – are aware of the issues regarding water governance and urban water management. Most of the local population of São Paulo has been aware of this too. However, there is also a huge part of society that is not aware of this problem. Civil society is targeting this unawareness by educating population or transcribing technical information into documents that are understandable for the local population. They also try to make people aware of the different uses of water: clean drinking water does not need to be used for cleaning purposes (e.g.). Next to this, they are trying to map other water resources such as creeks and springs. These creeks and springs are used for agricultural purposes without polluting the water. Therefore, this thesis has argued that when social actors are not able to participate in political decision-making processes, they will act by themselves in order to secure their access and availability of clean drinking water. Depending on their actions, they can target short- or long-term resilience.

Coming back to the main research question: resilience, in this thesis and the research it draws on, is perceived as a political process defined by state-society relationships. All the historical processes as well as the current actions done by government and civil society actors need to be taken into account when talking about the level of resilience before, during and after the drought of 2014-2015 in São Paulo. Namely, every single actor together with its actions has a different impact upon changes in resilience. Since it depends on the particular local socio-ecological context. This thesis argues that the cooperation between the different actors is needed to achieve short- or long-term resilience. It can be viewed that the local components of the system might be more effective towards targeting vulnerabilities on the local level. Meaning that they would be more capable of strengthening short-term resilience because they can react more effectively on local circumstances. Whereas, the government components of the system might be more effective towards targeting vulnerabilities on a national or state level. Meaning that they would be more capable of strengthening long-term resilience because they also need to take into account the larger political, social, economic and cultural aspects of society. However, in the end of this thesis, it is argued that both components need to work together in order to achieve the 'highest' level of resilience. By targeting the vulnerabilities in the specific local situations and focussing on the differences between short- and long-term resilience, São Paulo might be able to improve its water governance and urban water management. Therefore, the level of vulnerability of the city of São Paulo and its inhabitants is decreased and the level of resilience is strengthened. This can be seen as the new starting point when a next drought occurs. Therefore, resilience is an ongoing process and a fixed outcome will never be achieved.

This latter point is especially of importance. Most scientific articles use a fixed definition of resilience to describe its level in both ecological and social and political systems. Although this can be useful to describe the concept, it needs to be noted that a fixed definition of resilience can also be perceived that the concept itself is a fixed outcome. In this thesis it is considered as a political process defined by state-society relationships that are continuously changing, influencing and adapting to each other. It can result in a higher level of resilience but it can also result in a lower level of resilience. In this thesis, this depends on how Brazil and São Paulo are governed, managed, how and to what extent

civil society is included in political decision-making processes, how participatory processes are put in practice, how the state is held accountable for its actions and how civil society is increasing its level of resilience without the help of the government. Therefore, it can be argued that state-society relationships are present in every government level and in every local socio-ecological context. Since these levels and contexts are not fixed either, the concept of resilience is, in this thesis and the research it draws on, a political process defined by state-society relationships of which a fixed outcome will never be achieved since the fixed outcomes is non-existent.

Improvements and Future Research

With regard to the conducted case study of São Paulo, it could have been argued that a more in-depth argument with regard to participatory processes could have been made if it would have been possible for me to attend such a process. This same argument could be made for the civil society actions with regard to urban water management. The reason why I was not able to do this during my fieldwork in São Paulo at the beginning of this year had multiple reasons. First of all, there was a language barrier: my understanding of Portuguese was not good enough to participate in these processes or actions and most social actors in São Paulo did not spoke English. Secondly, it should be noted that most social actors – when they lack the access and availability of clean drinking water – are not 'working' on resilience as they are trying to survive. Especially in the informal settlements surrounding the city of São Paulo, this is an issue that is still present today. Lastly, most civil society actors stopped working on water related issues when they had overcome the drought of 2014-2015. Meaning that there was enough clean water available and there was no need for increasing awareness at other social groups or holding the state accountable for their lack of information and the forth.

For future research it could be interesting to research a particular social group or class with regard to their level of vulnerability and resilience. As a lot of information has been conducted about the marginalized social groups, the working class or the middle class could be interesting to see how they are handling impacts of the drought. The reason that I have not conducted this research is that the amount of respondents for the 'local population' was too low to make a generalization of a particular social group or class. It was also not my intention to make a generalization as it was my intention to show the importance of the impact of state-society relationships on the level of vulnerability and resilience.

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Appendix 1 – Open-Ended Questionnaire

O texto e as perguntas contidas neste documento foram traduzidos por mim: um não-falante de português. Desculpas antecipadas se a configuração das frases não estiver correta. Ainda assim, espero que as perguntas e o texto estejam corretos, possam ser entendidos e possam ser respondidos de acordo

Prezada,

Estou muito feliz por ter entrado em contato com você. Portanto, gostaria de agradecer antecipadamente que você reserve um tempo para ler este questionário e responder às perguntas nele contidas. Isso vai me ajudar muito com minha pesquisa sobre a água em São Paulo. Na primeira página, vou explicar novamente a minha pesquisa. Depois disso, explico-lhe como o questionário está configurado.

Obrigado novamente por me dar essa oportunidade de ter uma visão da questão da água em São Paulo.

Att.,

Eline de Koning

Atualmente, estou em São Paulo para fazer minha pesquisa sobre a infraestrutura de água, os sistemas de distribuição de água e o acesso e disponibilidade de água. Meu interesse por esse tema veio do evento que aconteceu em 2014/2015: a seca que afetou a população de São Paulo e sua cidade metropolitana. Intrigado com notícias, blogs e histórias de pessoas, acredito que seria bom mergulhar mais fundo neste tópico para levar ao próximo nível: o que aconteceu com a infraestrutura de água, os sistemas de distribuição de água e o acesso e disponibilidade de água. durante a seca? O que aconteceu depois? Há alguma mudança em como a água é acessada ou não? O que precisa acontecer para melhorar e se mover? O foco da minha pesquisa está em todos os aspectos da sociedade civil: da população local de São Paulo às estruturas governamentais e políticas (públicas) aos movimentos sociais e ONGs.

Porque eu acredito que os movimentos sociais podem ter um papel importante quando se trata de mobilização de pessoas e podem, portanto, influenciar o comportamento da população local de São Paulo e até mesmo políticas (públicas), estou curioso e ansioso para saber qual o seu movimento vem fazendo (antes,) durante e após a seca de 2014/2015 em relação a tudo o que está ligado à água.

A pesquisa tem um certo nível de confidencialidade. Se você não deseja que seu nome ou movimento seja mencionado em minha pesquisa, por favor me informe sobre isso. Eu não irei usar seu nome ou movimento em minha pesquisa. Se você não me informar, eu posso usar seu nome ou movimento ao escrever minha pesquisa.

Abaixo, eu configurei algumas questões que considero importantes quando olho para este tópico. Você é livre para responder a qualquer pergunta que quiser. Se você não quiser responder a uma pergunta, tudo bem também. Além disso, se você acha que outra questão sobre esse tópico é importante para mim (e que eu não disse neste questionário): sinta-se à vontade para escrever isso para mim.

Questionário Pesquisa Água em São Paulo, Brazil

Gostaria de começar com algumas questões gerais relacionadas com a seca de 2014/2015, o sistema de distribuição de água e o acesso e disponibilidade de água.

1. Minha pesquisa centrou-se principalmente na seca em dois mil e quatorze e dois mil e quinze em relação à infraestrutura de água em São Paulo e seus arredores. Quando você compara a disponibilidade de água no período anterior, durante e após a seca, o que você diria mudou? (há muitas mudanças ou não e quais são as mudanças, por que não há mudanças)

2. Do/Você pode receber água regularmente? (o tempo todo/é restrito/não)

3. Quando você perceberia uma situação como uma seca relacionada ao seu uso de água? Em outras palavras: quando você diria "esta é uma situação de risco"?

4. Se houver outra (grave) seca, você poderia ter acesso suficiente à água e à água potável? se sim, por que e como? Caso contrário, como você vai gerenciar então?

5. Quando você acredita que você é afetado por secas (ou outros eventos naturais) quando você olha para o seu acesso aos recursos (água, comida e adiante)?

6. Você se sente vulnerável quando pensa sobre (secas e) acesso à água? Você acha que você irá gerenciar ou não quando ocorre outro?

7. Quando você olha o período anterior, durante e após a seca de 2014/2015, você acha que a cidade e sua população melhoraram as secas ou outros eventos naturais? (cidades ubranas mais fortes, melhor infra-estrutura da água, etc.) Se assim for, como? Se não, por que não?

8. Por favor: se você também gostaria de contar suas experiências pessoais em sua própria vizinhança quando se trata de distribuição de água, disponibilidade de água e acesso a água, sinta-se à vontade para anotá-la. Pode ser qualquer coisa relacionada a isso: desde a infraestrutura de água e o sistema de distribuição em seu bairro até o modo como você está lidando, para garantir que você tenha acesso suficiente à água durante e após a seca de 2014/2015.

Agora, gostaria de continuar com perguntas relacionadas à sociedade civil, que podem consistir em movimentos sociais e ONGs.

9. Você poderia me explicar tudo sobre seu movimento / página no Facebook? (por exemplo: como você começou? Que tipo de motivos estavam por trás da ideia da página? Até que ponto você está mobilizando a população local de São Paulo? Até que ponto você está influenciando, por exemplo, estruturas e departamentos governamentais? Qual foi o seu papel durante e após a seca de 2014/2015?) Pode ser qualquer coisa relacionada e o que aparecer.

10. ONGs / movimentos sociais / cooperativas empresariais e outros e organização seriam úteis para garantir o acesso à água? É assim, como? Se não, por que não?

11. Onde eles fazem alguma coisa sobre a crise da água e infra-estrutura antes, durante e após a seca 2014/2015?

12. que você sugere que eles possam fazer para ajudar? A importância de lidar com as secas e o acesso à água, o que pode ser feito?

13. O governo e as ONGs estão trabalhando juntos para resolver o problema agora, mas também antes e durante a seca?

Por fim, gostaria de lhe fazer algumas perguntas sobre estruturas e departamentos governamentais, tais como leis e políticas com relação aos sistemas de distribuição de água e sua disponibilidade e acesso.

14. Você sabe se o governo já tem planos / políticas / estratégias em relação à infra-estrutura da água para garantir seu acesso à água? (ambos relacionados à população e à cidade)

15. Como as responsabilidades entre departamentos governamentais / governo e o resto da sociedade são divididas quando ocorre um evento natural ou seca?

16. Como os governos lidam com futuras secas (e a possibilidade de baixo acesso à água)?

Se houver algum outro tópico que você perceba como importante (e não tenha sido mencionado), por favor: sinta-se à vontade para anotá-lo.

Muito obrigado por preencher este questionário!

Eline de Koning