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Exploring Resilience of Water Management in Slovakia

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Abstract:

Water resource management in Slovakia is characterized by a ‘command-and-control’ paradigm. The main feature of this approach is in a view that is based on the predictability of the future water situation. People rarely think about water as an issue in Slovakia - the rivers flow, it rains, the taps run. However, after severe floods in 2010, more attention has been given to flood control and prevention. This research aims at revealing unsustainable water management practices in Slovakia through analyzing effects of this management on the municipal level. For this purpose, I conducted a series of interviews as well as distributed and collected questionnaires. The main focus of this study is on the evaluation of adaptability of the water management in Slovakia to respond to future unknown challenges through the use of the theory of resilient thinking. Furthermore, the concept of adaptive (co-) management is applied with four institutional prescriptions: polycentric governance system, public participation, experimentation, and the bioregional perspective. They are linked to the overall idea of resilient thinking where the limits of the prevalent technocratic approach to water management are put under critical scrutiny. The emphasis is on the recognition of the complexity, uncertainty and dynamics of this world. The results of the findings point to the most problematic areas of the water management in Slovakia, within each of the institutional prescriptions, from the municipal perspective. Overall, water management in Slovakia proved to be rigid and incapable of generating sufficient responses to unknown changes and challenges in socio-natural systems. If the water management remains without any adjustments, the difficulties people and mayors face in regards to floods will continue.

Key words: water management, Slovakia, flood control and prevention, resilient thinking, adaptive (co-) management, sustainability, political ecology, human ecology.

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Table of Contents

1. Introduction	1
1.1. Aim and research questions	2
1.2. Structure of the thesis	4
2. Introduction to the situation in Slovakia	5
2.1. Water governance in Slovakia	8
3. Analytical framework	10
3.1. Literature review.....	12
3.2. Theory of resilient thinking	13
3.3. Adaptive management of water resources	15
3.4. Adaptive (co-) management	17
3.4.1. Polycentric governance system	18
3.4.2. Public Participation	19
3.4.3. Experimentation	20
3.4.4. The bioregional perspective	21
4. Methodology	22
4.1. Quantitative research	23
4.2. Qualitative research	24
4.3. Primary research methods	24
4.3.1. Questionnaires	24
4.3.2. Interviews	25
4.4. Limitations.....	25
4.5. My role as a researcher	26
5. Water management in Slovakia	27
5.1. ‘Landscape revitalization and river basin management programme’	27
5.2. The story of water in Spiš and Šariš	29
5.2.1. Questionnaire results	30
5.2.2. Interviews	32
6. Analysis of the data	36
6.1. Monocentric governance system	37
6.2. Lack of public participation.....	38
6.3. Experimentation.....	40
6.4. The bioregional perspective.....	41
7. Discussion: from local to global water management	42
8. Conclusion	45
Bibliography	49

List of Abbreviations

EU: European Union

GWP: Global Water Partnership

IWRM: Integrated Water Resources Management

NATO: North Atlantic Treaty Organization

NGO: Non-governmental Organization

PM: Prime Minister

SR: Slovak Republic

SWME: Slovak Water Management Enterprise

UN: United Nations

WFD: Water Framework Directive

WHO: World Health Organization

List of Maps and Tables

Map 1.1: Location of Spiš and Šariš regions

Map 1.2: Spatial locations of rivers and springs

Map 2.1: Groundwater resources bigger than 5l/s.

Table 5.1: Summary of the numerical results from the questionnaires

1. Introduction

Environmental challenges such as climate change, water scarcity, and land degradation are receiving more and more attention. The unique feature of these challenges is the mixture of politics with environmental science creating the need for environmental governance. In particular, projections of water supply in combination with population growth rates are predicting dark scenarios for the future. The United Nations estimates that by 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity (UN-Water 2013). And then there is Slovakia, a country with more than enough water to supply twice its population (SHMU 2014, 32).

Water is vital for life. Without water, humans can survive only a few days (even less in hotter places) while we can survive weeks without food. And yet, we value diamonds more, and consider water as valueless or invaluable (Staddon 2010, 1). Already Benjamin Franklin noticed this paradox: “When the well runs dry, we shall know the value of water” (“A Quote by Benjamin Franklin”). Water is not distributed equally in the world, and a significant portion of the world’s population is approaching absolute water scarce situation (Staddon 2010, 2). Those countries will not have adequate resources to supply the minimum quantity of clean water that is defined by the World Health Organization (WHO) according to Gleick (1996) as 50 liters per person per day. The functions of climatic, hydrological and energetic systems in regards to water (even saline water) are crucial for human survival (Staddon 2010, 2). Climate change science has already revealed that even minor variations in temperatures of the seas and oceans may be linked with a rise of extreme weather events such as hurricanes or cyclones (Ibid.). The hydrosphere of the Earth provides essential resources for human survival. At the same time, it has a potential to produce devastating natural hazards. Understanding and managing water is a critical challenge for the 21st century. It is divergent task including water as a resource and as a hazard, as freshwater and as salt water. In Slovakia, the water resource base is far from scarcity but people experience water as a hazard. This view became even realer after severe floods in 2010.

People rarely think about water as an issue in Slovakia - the rivers flow, it rains, the taps run. Water governance is supposed to find a way to mediate the relationships between securing

sufficient quality and quantity of water while protecting people from flood risks. The supply of drinkable water remains in the background of discussions about water governance in Slovakia since people do not face difficulties in accessing drinkable water and scarcity is not a challenge (yet). However, the floods are gaining more attention. According to several scholars, the solutions to this socio-natural dilemma can lie in technological innovation, change in behavior, and/or political and institutional trajectories (Staddon 2010; Bakker 2010¹).

The topic of this thesis is the water management in Slovakia in regards to flooding especially the ability of the water management to respond to future challenges that may be uncertain at this time. The floods in 2010 caused much damage to lives and properties of the citizens. Therefore, the analysis will involve the perspectives of mayors from different municipalities about water management that are tied to their experiences with floods and consequent actions taken/not taken by the government. Water governance is broad concept that includes everything related to use, allocation and distribution of water services as well as the management. My focus is on how the state manages water resources in relation to floods. Therefore, I refer to water management in certain parts of the thesis rather than water governance.

1.1. Aim and research questions

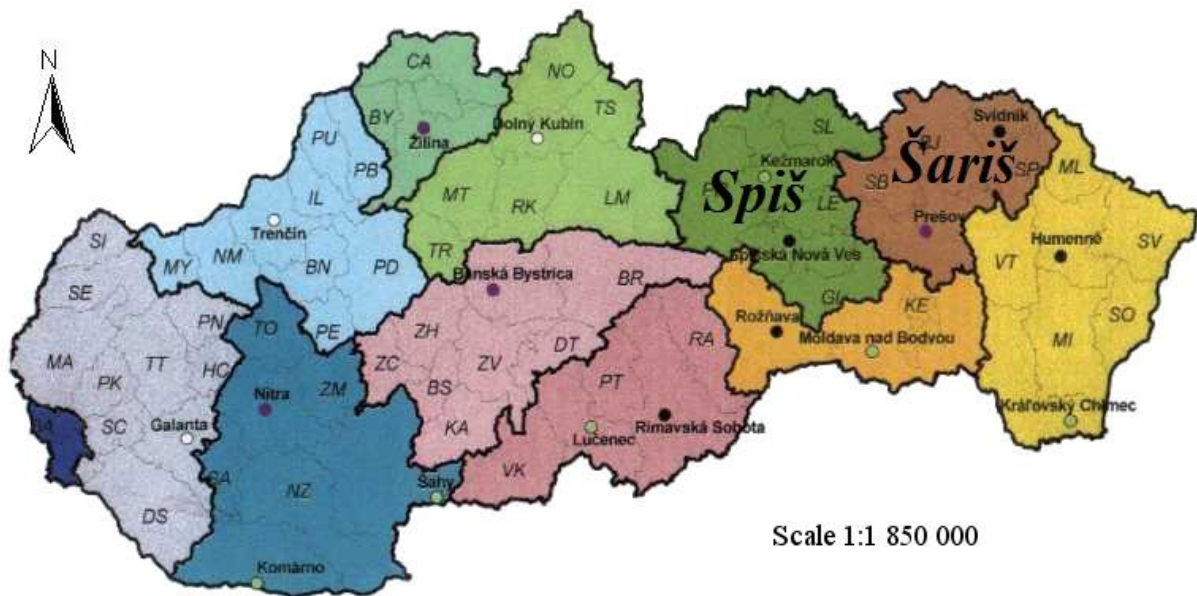
The aim of this thesis is to study how the centralized decision making about water in Slovakia affects local matters and what the perspectives of mayors about this are. This research aims at revealing unsustainable water management practices in Slovakia since there is not enough critical engagement with water issues in Slovakia. Different politics of scale are applied to water governance that in turn shape the power relations between the Ministry of Environment and the municipalities. The focus is on analyzing the combination of political, social and economic factors under centralized water governance within the political ecology framework. For this purpose, I draw on the theory of adaptive (co-) management as a point of reference for analyzing the water management in Slovakia. A scholar can study water management on different scales ranging from the local, national, basin to global. I chose to focus on the local

¹ Karen Bakker in her book *Privatizing Water* (2010) makes an explicit overview of the possible solutions and scholars who refer to them.

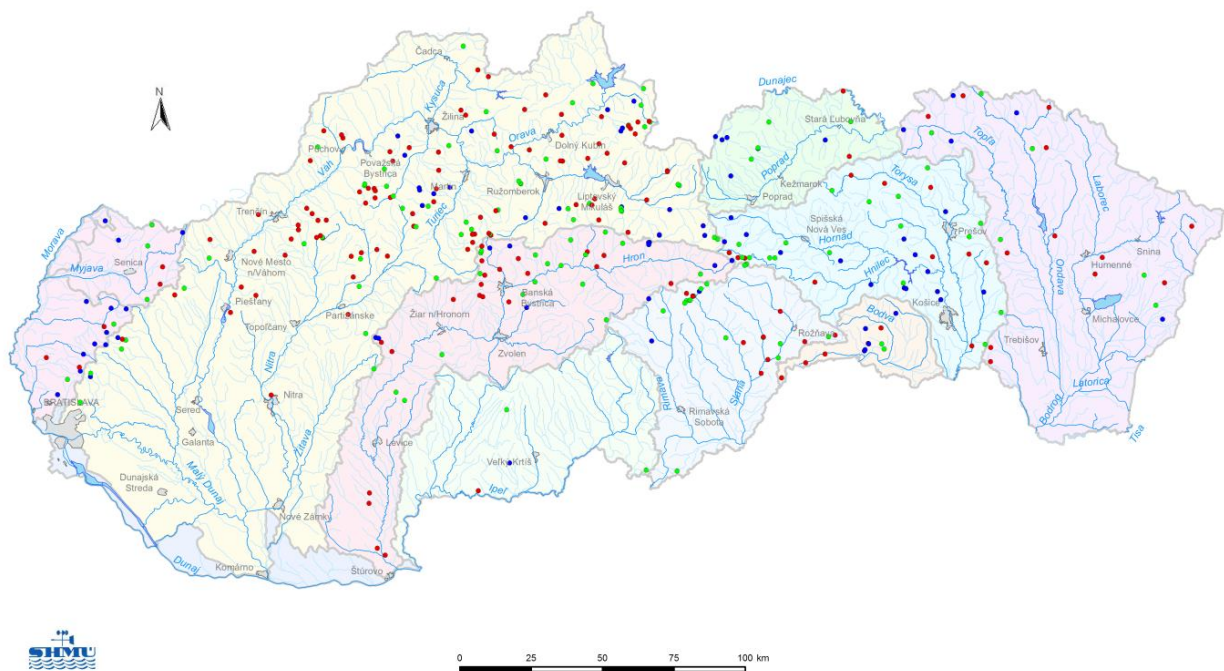
scale, the municipal. All of the scales are equally important to study but, it is crucial to start somewhere. This research is a case of empirical study of municipal experiences with water management. The history and culture of Slovakia as a post-soviet country has an influence on this empirical study. The aim is to identify the effects of this case of water management in order to see the most problematic areas in accordance with the adaptive (co-) management. For this purpose, I ask these research questions:

1. How resilient is the water management in Slovakia in regards to the municipal scale?
2. Which areas of the water management are the most problematic in accordance with the adaptive (co-) management?

In this research, I will try to answer these questions while focusing on two regions, Spiš and Šariš (see Map 1.1). These regions are located in the north-east part of Slovakia. This part has a mountainous landscape where a lot of rivers stem (see Map 1.2). Due to the regions' geographical and landscape composition, they experience regular flooding from the small rivers. Flood control is one of the aspects that need to be assessed in water management. Since Slovakia does not have immediate problems with a scarcity of drinkable water, the focus will be on the flood control and prevention as means to answer my research questions. This is not to say that water supply and sanitation are not important; however, given the circumstances of the case in hand, I made these choices. It should be noted that this research explores only the surface level of the issues mentioned above as there is no actual research about the adaptability of water management in Slovakia. In particular, the aim is to establish one (hopefully soon out of many) starting point through this thesis project.



Map 1.1: Location of Spiš and Šariš regions. (modified from Regionálna Rozvojová Agentúra Záhorie n.d.)



Map 1.2: Spatial locations of rivers and springs. (SHMU 2009)

1.2. Structure of the thesis

The first part of this thesis is a brief introduction to the situation in Slovakia. It is simplified to mainly political history since the creation of the Slovak Republic. This section is followed by

a basic introduction to water governance situation with an inclusion of the most recent debates about water in Slovakia. The purpose of this is to provide background information about the political, economic, social, and geographical, as well as water situation to a reader. The context of this empirical study is vital in order to understand the following parts of the thesis.

The second part of the thesis is about the analytical framework in use. The case of water management in Slovakia falls under the political ecology framework, due to a combination of factors that need to be considered, in order to make a valuable analysis of the situation. The literature review serves as justification for the choice of theory for this research project. The following part of the analytical framework is about the theory of resilient thinking and adaptive (co-) management through which the gathered data will be analyzed in order to answer the research questions. I will there clarify the framework in use in order to explore the water management in Slovakia. For this purpose, I have chosen a combination of quantitative and qualitative methods.

Next, I will present my findings gathered from primary and secondary data. This section includes findings from documents and literature and primary research methods; questionnaires and interviews as well as an observation from a conference about water. I will analyze these results in accordance with the theory in order to draw a conclusion in the end. Furthermore, I discuss the findings in broader theoretical perspective and identify possibilities for further research. Last but not least, I will conclude my thesis project by answering the research questions and recognizing the contribution of this study.

2. Introduction to the situation in Slovakia

After the *Gentle* Revolution (also known as Velvet Revolution) in 1989, Czechoslovakia nonviolently transitioned from being ruled by one party, the Communist Party of Czechoslovakia, to holding its first democratic elections in 1990 (BBC 2014). After four decades of communist rule² and separation from the Czech Republic, Slovakia's politics has undergone significant developments. In the beginning, the ruling coalition based their political

²Czechoslovakia became a single-party state in 1948 and remained so until the *Gentle/Velvet* Revolution in 1989 (History.com Staff 2009).

agenda around remaining in *status quo* in order to avoid the shock of the change of the regimes. This coalition was able to keep stability in a country where stability was previously unknown. At what cost is a question to be determined by someone else. However, in 1998 the tables turned and the opposition gained the majority of the seats in parliament, changing the political course Slovakia had taken (Ivantysyn 1999, 8-10). The next period was marked by economic reforms and changes that ultimately led to Slovakia's accession to EU and NATO in 2004 (MZVaEZ n.d.).

While the coalition was made up of center-right wing oriented parties (the strongest was SDKU, which later became SDKU-DS³), the opposition of left-wing parties was able to unite. In 2006, the biggest left wing party, SMER – Social Democracy⁴ (from now on referred to as SMER-SD), gained the majority of the votes and created a coalition with other two parties (Úrad vlády Slovenskej republiky n.d. (a)). The tables turned once again after elections in 2010. Although SMER-SD had gained the majority of the votes, the center-right wing parties agreed to a create coalition and consequently the leader of SDKU-DS, Iveta Radicova, became the Prime Minister (PM) (Úrad vlády Slovenskej republiky n.d. (b)). She was also the first woman to become Slovak Prime Minister. However, in 2012 the Slovak Parliament agreed to shorten the usual four-year election period. They set a date for early elections after Radicova faced lack of support from her party and other parties in the coalition (Henderson 2012, 3). In other words, the government fell. The left wing SMER-SD gained majority of the seats in the early elections and created a government without the need to establish a coalition with any other political party: one-party government (Ibid.).

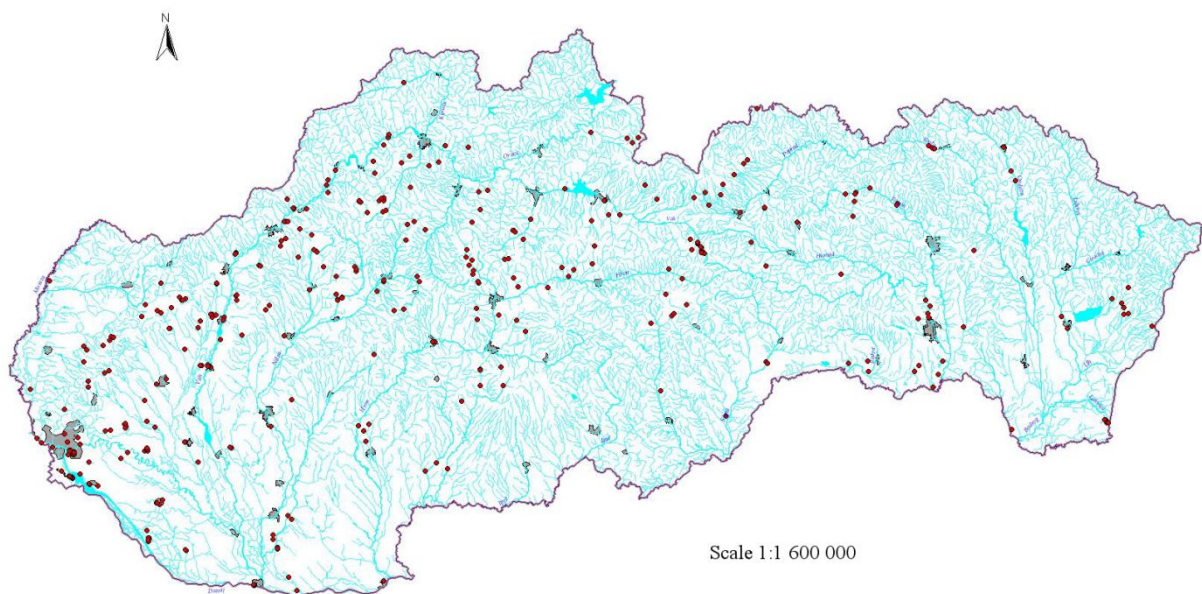
Today, there are about 5.4 million Slovaks living on little more than 49 thousand square kilometers in 8 counties, 79 regions, 138 cities, and 2,933 municipalities (Úrad vlády Slovenskej republiky n.d. (c)). The landscape is diverse, ranging from mountainous nature extending across most of the northern half of the country to fertile lowlands in the southwest and southeast. Slovakia is situated in a temperate climate zone and lies on the watershed of the Black Sea (96%) and Baltic Sea (4%) (Kris and Skultetyova 2009, 534). All rivers rise

³ SDKU-DS stands for 'Slovak Democratic and Christian Union – Democratic Party'. The abbreviation is made from the name in Slovak language.

⁴ SMER translates as 'Direction'.

during springtime due to melting snow in the mountains and sometimes during summertime due to heavy rainfall, except Danube, which rises during summer due to melting snow in the Alps (Ibid.). Groundwater is crucial because it is the primary source of drinking water in SR (Ibid., 535). It is distributed unevenly; the Eastern region enjoys only 17% of the total volume in contrast to the Western region that receives 56% (Ibid.).

Water consumption in Slovakia decreased between 1991 and 2011 (with the exception of 2003) due to changes in agricultural and economic development, and increasing price of water (SHMU 2014, 31). The amount of water consumed by food, animal and crop production and other industries decreased since the first measurement in 1989 (Ibid., 33). According to the Slovak Hydrometeorological Institute, the estimated human water consumption in the future is secured (Ibid., 31) (see Map 2.1). Extraction of drinkable water in 2012 was only about 14% out of the overall documented amount of usable ground water. (Ibid., 32). However, due to geographical differences there might be significant problems with the supply of drinkable water (in the future) depending on the region.



Map 2.1: Map of groundwater resources bigger than 5l/s from 2008 (SHMU 2008). Groundwater is measured in liters per second. The red dots are probes for measurement.

2.1. Water governance in Slovakia

In Slovakia, water management is centralized to the Ministry of Environment which has the overall responsibility for water affairs (Water Research Institute Bratislava 2011, 4). Although, the water supply and sewage services have been decentralized, it is legal liability of the municipal governments, the municipalities often lack capacity to raise sufficient funds and risk that water issues get buried under many other priorities (Kindler and Liiv 2003, 11). In 1997, the Ministry of Agriculture had established the Slovak Water Management Enterprise (SWME) (Ministerstvo Životného Prostredia 2007, 1). It is a state-owned enterprise under the Ministry of Environment since 2003 (Ibid.). The enterprise is responsible for the management of water streams in Slovakia (Water Research Institute Bratislava 2011, 6). Article 4 of the Slovak Constitution states: “natural wealth, underground water, natural medicinal springs, and waterways are in the ownership of Slovak Republic” (“The Constitution of the Slovak Republic”). The SWME manages property that is exclusively owned by the SR thus, by the citizens through means of representative democracy. The SWME is obliged to follow the Water Act, which had been created in accordance with EU’s Water Framework Directive (WFD) (Water Research Institute Bratislava 2011, 10). In addition, small water streams can be also administrated through state organizations of forest management; e.g. Forests of the Slovak Republic Banská Bystrica, Forest and Agricultural Property Ulič, Military Forests and Property of the Slovak Republic, Pliešovce and National Forests TANAP (Ibid., 6).

The SWME has a certain way of choosing what kind of projects will be implemented. Overall, they deploy a technocratic approach that prefers building of, for instance, large concrete dams in order to secure water supply and conserve water in the country. In contrast, PM, Iveta Radicova, implemented a program called ‘Landscape Revitalization and Integrated River Basin Management’ (from now on referred to as revitalization program) in 2010 (Kravcik et al. 2012, 18). It was based on an acknowledgment of the need to revitalize the landscape’s ability to hold water that was weakened due to farming methods (Ibid., 19). The main difference of this program, compared to previously adopted solutions to the same issues, was in implementing small local projects that involved numerous towns and villages. 80 thousand different water retention elements were carried out in the short period of 18 months

(Kravcik et al. 2012, 21). The main proponent of this program was Michal Kravcik⁵. This type of landscape restoration sometimes caused heated debate in the professional sector. A group of scientists from the Slovak Academy of Sciences strongly opposed to Kravcik's solutions and argued they are not sufficient for the current situation and that Slovakia should go back to the previous approach (Archive-SK 2012). Although some of the arguments against this program were based on hydrology, most of them had the political context of left versus right and from my point of view some of them were even based on *ad hominem*. Nevertheless, the program depended on governmental support, and with the early end of Radicova's electoral term the program was canceled by the next government (SMER-SD) in power. In the questionnaires and interviews, I researched this issue and asked several questions about the program that I will analyze later in the thesis.

The most recent turmoil about water resulted in a change in Slovakia's constitution. It all started in 2013 when the Ministry of Environment presented a new amendment to Slovakia's water law. The Ministry argued that the revised version of the law must include exports of water in order to comply with EU rules on internal markets, e.g. free movement of capital, goods, services, and labor (EEA n.d.). This amendment was unnoticed for a while. However, at the end of 2013 citizens started to express strong disagreement with this amendment through signing a petition that gained 8.500 signatures (Thalmeinerova 2014). In March 2014, the European Commission published *Communication from the Commissions on the European Citizens' Initiative* called, "Water and sanitation are a human right! Water is public good, not a commodity!". It was there stated, among others things, that water resources are not subject to 'internal market rules' thus should be excluded from liberalization (European Commission 2014, 2). Based on this communication, the Ministry could suggest prohibition of the export of water without defending this suggestion in the EU.

Furthermore, Dr. Danka Thalmeinerova, Global Water Partnership (GWP)'s Senior Knowledge Management Officer, presents three strong arguments against the proposed amendment. First, the current data about volumes of groundwater are not sufficient to estimate water consumption in the present and future of citizens, economic sectors, and

⁵ Michal Kravcik is founding member and chairman of the NGO People and Water (www.peopleandwater.sk) as well as a hydrologist and environmentalist.

ecosystems combined (Thalmeinerova 2014). This assessment is required by the EU WFD and was supposed to be completed in 2013. Secondly, groundwater availability is decreasing, and it is becoming harder to extract (Ibid.). Third, recently some water resources were excluded from public water supply because they do not comply with quality standards anymore – they are polluted. Thus, the groundwater quality is deteriorating (Ibid.).

After substantial critique from different perspectives, the government stopped all negotiations about the amendment. However, it proposed a new constitutional law that explicitly prohibits water exports in order to correct their public image. The opposition also criticized this attempt while arguing that the current Article 4 of the Constitution serves the purpose of water protection from exports and there is no need to add the additional paragraph (Pravda 2014). In other words, the constitution should be only changed when it is an absolute necessity since it is not a “binder” but the foundation of Slovak Republic. However, the current government has the majority of the seats in the parliament, so they can pass any decision without the need of additional support of any other political party. On July 2014, §17a was added to the SR constitution (Ibid.). It prohibits the transport of water resources extracted from the SR territory by any vehicles or pipelines through SR borders with the exception of personal use or humanitarian aid (Čarnogurský ULC 2014). The personal use is further specified as drinkable water in the maximum volume of 20 liters per person (Ibid.).

3. Analytical framework

A field of political ecology seeks to understand political forces at work in environmental issues such as accessibility, management, and transformation (Robbins 2012, 3). The politics of water management is inevitably an ecological issue as well as hydrology is inherently political. Political ecology has many definitions and attracts a vast variety of researchers with different backgrounds. Some are physical scientists, methodological technicians, or behavioral scientists. All of them have at least one notion in common: to challenge the current conditions (Ibid., 5). However, all of the different approaches as well as definitions share common characteristics and elements (Swyngedouw et al. 2002, 124-125; Paulson et al. 2003, 212). Together, they define political ecology as the explicit alternative to apolitical ecology (Robbins 2012, 14). By this research in the field of political ecology of water, I intend to shed

light on the interconnection between human and non-human aspects in the world where this approach remains stubborn fiction.

There is increasing attention among scholars regarding the importance to consider the water cycle as a hydro-social cycle. The hydro-social cycle refers to a fusion of human and non-human processes that shape the hydro-social configurations (Budds 2008; Linton 2010; Swyngedouw 2009). In this context, water issues such as scarcity are socially constructed. Thus, the issues reflect unequal political and economic power (with few regional exceptions) (Swyngedouw 2013, 828). This inequality is embedded in and expressed by the dynamics of the hydro-social cycle. In this thesis project, the focus is on the empirical case of water management in Slovakia. I ask questions about the decision-making process about water and how this affects different municipalities. The examination of water governance in Slovakia requires a closer look at the power dynamics of decision making while taking into account the local needs. In other words, I seek to understand socio-natural relations for which I will draw on a political ecology framework and the hydro-social concept.

The focus of this research is, among others, on the aspect of the sustainability⁶ that is tightly connected to the political ecology. Sustainability is an immensely complex concept that makes the attempts at defining the governing process which would support the sustainability terribly complex. In the book, *Governing Sustainability* Tim O’Riordan (2009, 308) reflects on this: “All authors in the book are skeptical that society is producing political structures that can guide it towards sustainable future. But then no-one really knows just what such a future would look like.”

Since it is impossible to predict the future, in order to bring sustainability aspect to the water resources management, the focus is on the ability of water management to adapt to the uncertainties of the future. For this purpose, I chose to apply the theory of resilient thinking and the concept of adaptive (co-) management to the empirical case of water management in

⁶ There is not an internationally accepted definition of sustainability. For further references about defining sustainability see for example; Costanza 1995, Allen et al. 1993, Brown et al. 1987, or Plumwood 2002.

Slovakia in order to answer the research questions within the overall analytical framework of political ecology.

3.1. Literature review

Water is, in general, a very broad issue so the academic literature about water includes simultaneously many meanings water can have. According to Karen Bakker manifold functions of water are “an economic input, an aesthetic reference, a religious symbol, a public service, a private good, a cornerstone of public health, and a biophysical necessity for humans and ecosystems alike” (2010, 3). The extensive number of meanings of water affects the number of ways of how to study water issues.

There are different philosophies arguing for different ways to approach the topic of water. One group deploys liberal environmentalism, green neoliberalism or market environmentalism⁷. These philosophies argue that water is becoming a scarce resource that must be priced at full economic and environmental costs (e.g. Rogers et al. 2002, Shirley 2002, Winpenny 2003, Dinar 2000). This would ensure allocation of water to highest value uses and profitable management of the water by private companies that are more directly accountable to customers and shareholders than the political representatives (Bakker 2012, 21).

Another body of literature argues against the neoliberalization through advocating for water as a human right. The proponents of human right to water see the neoliberal approach as problematic especially in introducing the market logic to the water management which is incompatible with guaranteeing the human right to the citizens (e.g. Shiva 2002, Assies 2003, Barlow and Clarke 2002, Petrella 2001). This approach falls short at foreclosing the involvement of the private sector in the water (supply) management despite the undeniably good intentions of this campaign (Bakker 2012, 28).

⁷ For further information on these approaches to the water see Bernstein 2001, Goldman 2005, Bakker 2004, 2010.

In contrast to the two views mentioned above, a third one emerged: view of the water as a common pool resource⁸. In simplified form, it argues for alternatives of water management. The most progressive strategies under the ‘commons view’ adopt twofold tactic: first, reforming (rather than abolishing) state governance and secondly, fostering and sharing alternative local models of resource management (Bakker 2012, 33). The prospective ‘commoners’ should also include the non-humans perspective when making decisions about the water (Ibid., 36).

Slovakia does not have any severe and immediate problems with the supply of drinkable water since the amount of such water is larger than the current consumption (SHMU 2014, 32). There are many different ways, supported by a substantial body of literature, through which water management in a country can be explored such as politics of the scale, stakeholder participation and more. They all provide useful framework and tools for research, but I chose to study Slovak water management through lenses of resilient thinking and adaptive (co-) management (described in a later section). This approach is consistent with a view of the water as a common-pool resource. The two Slovak regions, I focus on, experience lot of flooding that is caused by small rivers usually during the spring while it is unpredictable whether there will be a flood next year or not. Although a lot of valuable literature has been written about water governance, the theory of resilient thinking seemed as the most suitable approach to answer the research question(s).

3.2. Theory of resilient thinking

In this chapter, I will introduce the resilient thinking with an emphasis on the key points that are necessary to keep in mind in order to move to the next section. It is followed by linking the resilient thinking with water resource management based on how this type of thinking can produce a new vision for water management which would recognize the interconnectedness of social and ecological components. The next section is about the concept of adaptive (co-) management. Here, I will go into more detail about this concept since it is the main theory for my analysis. The aim of this whole section is to lay down the theoretical background for the later analysis of the primary and secondary data.

⁸ Several scholars applied the view of water as common pool resource in their analysis of water management: Heikkila 2004, Leonard et al. 2015, Wutich 2009, Deneke n.d., Schluter and Pahl-Wostl 2007, and more.

Humans are currently living beyond their means on a planet with finite resources (Robbinson 2004, 7). The market solution to scarcity of goods is an increase in price which results either in the use of substitutes and new technologies to increase efficiency or a decrease in demand for that good (Ibid., 8). While this prognosis is highly problematic when applied to any resource (Ibid.), it is even trickier in case of water because it is a finite source without substitute. The current environmental and resource management policies seek to bring back the balance between supply and demand. Although the policies are still needed, they will not solve the problem. People believe(d) that it is possible to manage individual components of an ecological system independently in order to optimize the balance between supply and demand (Ibid., 9). However, as we learn more about ecological as well as human systems, these assumptions become invalid (Simonsen et al. n.d., 3). We live in a world that is characterized by a dynamic change in both ecological and social systems (Ibid., 4). It is still important to manage the supply of specific products, but it is as important to manage systems to enhance their resilience. In other words, apply resilience thinking.

In their book *Resilience Thinking*, Brian Walker and David Salt define resilience as “the ability of a system to absorb disturbance and still retain its basic function and structure [its identity]” (2006, 1). They connect the resilience to sustainability and ask: how can we make the systems that we depend upon resilient? The world population keeps growing while the resource base is declining. There is a broad spectrum of reasons for this decline including poverty, greed and overexploitation but ignorance and misunderstanding also play their role in it (Ibid. 22). The way we currently use and manage resources is not working and we are constantly told that the solution lies within the same unsustainable realm where humans tend to be placed outside the system (Ibid.).

There are several key points on resilience thinking. First, the current approach to natural resource management is based on average conditions and expectations of growth that ignores major disturbances and optimizes some components of a system in isolation from others (Simonsen et al. n.d., 4). This approach is failing us because it does not acknowledge how the world actually works – it is unpredictable, interconnected and dynamic thus managing

resources based on models, averages, and expected growth does not work (Walker and Salt 2006, 31). Secondly, ‘business as usual’⁹ does not recognize secondary effects that cause (irreversible) changes in the bigger system (Ibid., 22). Unless we consider the broader system, we will not achieve sustainability. Resilience thinking also emphasizes the need to understand and engage with a changing world (Simonsen et al. n.d., 12). Through this understanding, we can build a capacity to work with change rather than being victims of the change (Walker and Salt 2006, 14).

Resilience thinking concentrates on thinking about systems in a long-term perspective (Walker and Salt 2006, 31). People are great at short-term optimization but have trouble over longer timeframes which requires system thinking (Ibid., 45). An optimization refers to a belief according to which if we get a system into some particular ‘optimal state’, we will get the maximum sustained benefit (Ibid., 6). This can work for immediate benefits. However, the optimization approach is proving to be anything but sustainable (Ibid., 31). Three concepts are essential to system/resilience thinking (Ibid., 32-37):

- We are all part of the system
- Appreciating that it is a complex adaptive system
- Resilience is a key to sustainability

In other words, resilience thinking is a way of looking at the world. Instead of striving for constancy, it embraces understanding change (Simonsen et al. n.d., 12). It started with an attempt to understand how and why ecological systems change, but it has grown to include a lot more.

3.3. Adaptive management of water resources

Traditionally, water resources management has been up to engineers with technical knowledge who emphasized predictable and controlled systems. Given the dominance of this approach, they were able to develop a vast array of methods and tools, based on their experiences, to address environmental and quantifiable uncertainties (Pahl-Wostl et al. 2007, 3). However, with the recognition of increased climate variability and long-term climate

⁹ In this case, ‘business as usual’ refers to the prevalent conduct of business regardless of current circumstances (difficulties or morality).

change together with population growth, traditional water resources management proves to be insufficient and in need of rethinking. Rees (2002) emphasizes the need to consider economic, social, and political uncertainties. Furthermore, it is possible to identify different categories of these uncertainties that need to be taken into account when addressing a management problem (Pahl-Wostl et al. 2007, 3-4). Additionally, social and ecological components are viewed as inherently linked in complex systems (Simonsen et al. n.d., 4). This has created space for resilience thinking to influence water resources management.

The traditional system paradigm of water resources management has been characterized as ‘command-and-control’ approach (Pahl-Wostl et al. 2007, 1). In short-term, the technological fixes proved to be efficient, for example, the constant improvement of wastewater treatment plants that deal with problems related to hygiene and pollution (Ibid.). However, these fixes address problems in isolation to the broader context, so potential long-term undesirable consequences are not considered.

New and more integrated approaches to water management have begun to emerge in the past two decades (Pahl-Wostl et al. 2007, 1). For instance, the principle of integrated water resource management (IWRM) has been used as framework by GWP for implementation of such integrated approaches to water management (GWP-TEC 2000). It clearly indicates the need for including a wider range of potential trade-offs at different scales in space and time. According to a group of scholars (Pahl-Wostl et al. 2007), implementation of such a integrated approach which would account for the complexity and interdependencies of socio-technological-environmental systems is yet to be realized (Ibid., 2).

Adaptive management accounts for such uncertainties and requires rethinking of the role of resources management in a dynamic world. Adaptive management can be defined as; “a systematic process for improving management policies and practices by learning from the outcomes of management strategies that have already been implemented” (Ibid., 4). In the case of water, adaptive management aims at increasing the adaptive capacity of the water system through learning processes and the conditions needed for learning processes to occur

(Simonsen et al. n.d., 12-13). Learning contains a broad range of processes including ecological, economic, and socio-political spheres (Pahl-Wostl 2002, Gleick 2003).

Often, there is mutual dependence among elements in water system such as technical infrastructure, citizen behavior, and engineering rules (Pahl-Wostl et al. 2008b, 18). For example, extensive technical infrastructure for flood protection creates citizens' expectations regarding safety and risk perception. This dependence has co-evolved over a long period and can develop into lock-in situations that block any changes towards new ways of resource management schemes (Pahl-Wostl et al. 2007, 9). In order to get out of this lock-in situation, actors need to recognize mutually shared paradigms that can open the door to compromise (Ibid.). In other words, different groups need to learn and increase their awareness of the biophysical environment, as well as the complexity of social interactions. However, consensus does not necessarily have to be achieved, rather a minimum level of trust which can serve as the basis for transparent and efficient communication (Ibid.). Individual countries need to develop and implement management strategies that take into account the political and environmental context rather than adopting blueprints from other (foreign) institutions or technologies that may be inappropriate for their situations (Ibid., 15).

3.4. Adaptive (co-) management

The previous section has laid out some central aspects of adaptive management and also made clear that the dominant technocratic approach is insufficient due to the incapability to deal with changes and uncertainties of the future. In the following, the focus is on the adaptive (co-) management which extends the approach of adaptive management and as a result of this, addresses specific areas that need to be tackled in order to analyze the water management in Slovakia.

Adaptive co-management is a novel combination of the adaptive management and co-management. While the non-technocratic adaptive management focuses on structured experimentation combined with flexibility, the “co-management emphasizes the sharing of rights, responsibilities, and power between different levels and sectors of government and civil society” (Huitema et al. 2009, 3). Policy implications are the main focus, in this type of

research, where literature on governance is particularly relevant because institutions and their efficacy are its core focus (Ibid., 4). There are several ways to define governance, in this thesis I take the definition by Pierre and Peters (2000, 1); “[governance means] the whole range of institutions and relationships involved in the process of governing”. This definition includes both the formal and informal institutions. The first type of institutions include laws, official policies, and organizational structures, and the latter refers to developed power relations and practices and rules that are followed in practice (Huittema et al. 2009, 4).

Huittema together with other scholars (2009) assessed the institutional prescriptions of adaptive (co-) management based on extensive review of water governance literature. They identified four institutional prescriptions: 1. collaboration in a polycentric governance system, 2. public participation, 3. an experimental approach to resource management, and 4. management at the bioregional scale (Huittema et al. 2009). These prescriptions are further described below and used as a theoretical point of reference for analyzing gathered primary and secondary data.

3.4.1. Polycentric governance system

According to the literature on governance, polycentric governance is a system in which “political authority is dispersed to separately constituted bodies with overlapping jurisdictions that do not stand in hierarchical relationship to each other” (Skelcher 2005, 89). The opposite of polycentric is a monocentric system. Power should be distributed to multiple centers (polycentric) rather than one centralized control (monocentric) in the adaptive (co-) management (Huittema et al. 2009, 5).

Polycentric governance systems are more resilient than the monocentric systems, so they can cope with change and uncertainty (Simonsen et al. n.d., 16). The reasons underlying this ability are several. First, issues surrounding water resources management with different geographical scopes can be managed at various scales (Ibid.). Secondly, polycentric systems overlap with each other which make them less vulnerable (Huittema et al. 2009, 5). In other words, if one unit fails, other units can take over its functions. Thirdly, units can learn from

each other because of a possibility to experiment with new approaches due to large number of units (Ibid.).

There are certain possible disadvantages to polycentric governance systems. If the units in the system are small, it makes the collective decision making difficult because of the need to handle several factors such as “complexity of spatial patterning, multiple functional overlays, partial polity formation, and variable system coupling” (Skelcher 2005, 102). These may be resolved by improved coordination but the costs of the coordination are high, and if done insufficiently, it may result in duplication of efforts and consequently counterproductive actions may happen (Huitema et al. 2009, 6).

Acceptable scale to measure a degree of how polycentric a system is, does not exist yet (Ibid., 6). However, we can observe that all water management systems are polycentric with differences from case to case. Huitema and other co-authors concluded, based on their review of governance literature, that polycentric governance system is desirable, but one should keep an eye on potential coordination problems, transaction costs, and democratic legitimacy troubles (2009, 7). In the case of water management in Slovakia, the focus is on whether the water management is polycentric (or monocentric) and how previously mentioned factors are handled by two different approaches the country has experienced.

3.4.2. Public Participation

Public participation can mean different things to different people. It can range from general public to various categories of the public (e.g. water users or organizations). Under adaptive (co-) management, public participation refers to collaboration between governmental and non-governmental actors/stakeholders (Huitema et al. 2009, 7). Proponents of public participation refer to several advantages of this approach; improved quality of decision-making process, public understanding of the issue at stake, transparency, democracy, and more (e.g. Mostert 2003, Ridder et al. 2005, Reed 2008). It is an especially useful approach when a government does not have sufficient resources such as information, power, and finance to manage an issue effectively (Huitema et al. 2009, 7).

The success of public participation is reported in a vast number of empirical studies. However, there are also possible obstacles to this institutional prescription. The role of different stakeholders in a process may lack clarity (Simonsen et al. n.d., 14). Furthermore, the existing governance style may not be participatory where authorities lack experience with multi-party approaches. It can lead to authorities relying heavily on technical expertise, unwillingness to change, fear of losing power, or fearing too broad of a participation that could harm confidentiality of proceedings (Huitema et al. 2009., 8). As a result of these fears, public participation might be limited to providing information or consultation.

Public participation will only be successful if the process is relevant to the stakeholders (who are supposed to participate). It is in contrast to technocratic approach to water management since a problem should not be narrowly defined by experts and/or authorities; rather this definition should be open to discussion and should emphasize collaboration between governmental and non-governmental stakeholders (Simonsen et al. n.d., 14-15). In the end, approaching water management through public participation creates a more democratic and transparent process (Huitema et al. 2009, 9). In Slovakia, public participation is still under development as it is not so long ago when it was prohibited, and all the power was centralized to authorities. I will assess the issue of public participation approach through analyzing findings from my primary data.

3.4.3. Experimentation

Experimentation as institutional prescription may be interpreted as a research methodology or as an approach to management. The first interpretation fits more in positivistic philosophy given its emphasis on expert knowledge and little room for public participation (Huitema et al. 2009, 9). On the other hand, the latter follows a constructivist philosophy that perceives science as socially determined (Ibid.). Furthermore, it recognizes the hypothetical character of management since it is always based on incomplete and uncertain information and thus sees management itself as a form of experimentation (Ibid.). In this thesis project, the latter explanation of experimentation approach is taken into account. Together with public participation it can bring together multiple stakeholders who can learn with and from each other through experimentation which may increase their capacity to deal with uncertainty and

change (Ibid.). This approach recognizes limits of our knowledge and emphasizes learning from experience.

The literature on planning has dealt with experimentation as an approach to management. The so-called “rational planning model” received a high degree of popularity after WWII (Ibid., 10). Decisions were based on a scientific analysis of the issue at stake (Ibid.). Moreover, all the aspects of the issue, possible alternative approaches and all different effects of these alternatives had to be determined as well (Pahl-Wostl et al. 2007, 2). Typical characteristics of this model are centralized decision-making, utilitarian decision logic, long-term planning, and a willingness to intervene on in socio-ecological systems on a large scale (Huitema et al. 2009, 10). After waves of criticism, governance scholars focused on emphasizing small steps and rather passive forms of experimentation – ‘trial and error learning’ (Ibid., 10). The trials should be designed and conducted in a participatory way involving a range of relevant stakeholders and actions should be managed by mutual interaction instead of planned from the center (Collingridge 1992).

Since the aim of this study is to generate an overall picture of adaptive (co-) management rather than going into great depth within each of these prescriptions, I will narrow experimentation to taking the revitalization program as an example of the experimentation. Thus, I will highlight the positive and negative impacts from the municipal perspective while the focus will be on lessons learned from this program.

3.4.4. The bioregional perspective

The fourth institutional prescription is a bioregional perspective. It emphasizes the importance of looking at ecosystems as a whole even if it crosses administrative boundaries (Huitema et al. 2009, 11). In water management, it means to concentrate on a basin level approach (Ibid.). According to the basin approach, the watershed is the appropriate scale for organizing water resources management (Schlager and Blomquist 2000, 1). Furthermore, the basin approach is essential for adaptive (co-) management while particular attention should be on cross-boundary water issues (Huitema et al. 2009, 11). The scale at which one analyzes water management issues determines the focus of the whole project. Today, there are different types

of water resource governance; local, national, basin, and global (Pahl-Wostl et al. 2008a, 421). I will be looking at local experiences with the national level of water management in Slovakia. I will thus not focus on water issues that involve other countries. However, even at the local level I will refer to bioregional perspective (within the Slovakian borders) as it is still an important factor in determining the state of adaptive (co-) management in Slovakia. Overall, the design of water management does not only depend on conveniences and practical demands but also on politics and influence (Huiteima et al. 2009, 13). It may not be desirable to suggest the entirely new institutional structure of the country since it is very hard to predict how the new institutions would work in practice. Rather the design should reflect learning from experience through adjusting above mentioned prescriptions.

The four institutional prescriptions under the concept of the adaptive (co-) management are useful in order to reveal the adaptability of the water management in Slovakia. They are linked to the overall idea of resilient thinking where the limits of the prevalent technocratic approach to water management are put under critical scrutiny and emphasis is on the recognition of the complexity, uncertainty and dynamics of this world. This theoretical approach to the empirical study of the water management in Slovakia discloses problematic areas within the notion of sustainability in water resource management.

4. Methodology

The methodological approach of this thesis complies mostly with the critical realism. It is a suitable approach to the topic as it tries to avoid both epistemic relativism (an extreme case of social constructivism) and judgmental relativism (an extreme case of legal positivism) (Sayer 2000, 47). A water management is socially constructed, but it relates to hydrology that is of positivistic nature. Critical realism is open to the creation of new knowledge that serves as a solid ground to the concept of sustainability, resilience, and consequently of adaptive (co-) management. Furthermore, it accepts knowledge from natural sciences, social sciences and lay knowledge (Isaken 2012, 12). Given the particular study in hand, a combination of quantitative and qualitative methods is used to gather primary data for my research.

I chose the methodological approach depending on different possibilities to gather primary data. I was fortunate enough to be invited to a conference about water in northern regions of Slovakia, Spiš and Šariš. Furthermore, I was given the opportunity to hand out questionnaires and contact forms for interviews. In my analysis, I will combine the quantitative findings from the questionnaires with qualitative data gathered through the interviews.

4.1. Quantitative research

Through the use of a quantitative approach, I seek to find numerical data about: a. water management in different municipalities, b. existence of floods in the regions as well as flood prevention, c. how many mayors think that the current governmental approach to flood prevention is sufficient, d. evaluation of the revitalization program that took place under previous government. The findings will be descriptive of the present situation in the regions in connection with water governance and the main decision-making body, the Ministry of Environment. The conference where I distributed and gathered the questionnaires happened on March 18th, 2015 in city of Levoča, and had about 80 attendees among whom at least 50 were mayors. The quantitative approach allowed me to conduct research that involved 39 of the mayors. It would not be possible through qualitative approach due to limited time and resources. Also, the general results can be used in other relevant studies.

On the other hand, the quantitative data provide only numerical descriptions that omit narrative and elaborate human perceptions on the issue under study. The answers the mayors gave in questionnaires do not necessarily reflect how they feel about the water management in Slovakia. It is even possible that the responses were not honest and followed the social desirability principle. I, as a researcher, made my decisions and assumptions about what is and what is not important thus, there is a possibility I missed something of importance in the questionnaires. Therefore, I decided to use a combination of quantitative and qualitative methods to enrich the numerical data with data collected through interviews.

4.2. Qualitative research

The qualitative approach develops this project by providing depth and detail about water management in Slovakia, especially regarding the attitudes and behaviors of mayors in different municipalities. This approach is open to new topic areas that were not initially considered in the questionnaires. Since the focus is on the power relations between the Ministry of Environment and different municipalities, the detailed picture is only possible to access through qualitative approach, the interviews. Furthermore, the interviews can provide more detail on the responses that I gathered through the questionnaires.

Nevertheless, the collection of qualitative data is time-consuming and limiting in number of responses I was able to gather. However, the number of the answers was not restricted only due to time and resources. In the case of Slovakia, the mayors are not used to being interviewed about their work for research purposes. It was one of the many challenges I faced, to persuade the mayors about my honest interest in their opinions. Also, only small portion of the mayors who attended the conference was willing to take part in the interviews. Because I was able to interview only five people it makes it challenging to generalize the results. Last but not least, the quality of the interviews depended on my skills as an interviewer.

4.3. Primary research methods

4.3.1. Questionnaires

When I was designing the questionnaire, I chose three main areas of interest; water governance, floods and the revitalization programme. I filled each area with a couple of direct questions and possible answers (see Appendix A: Questionnaire design). I wanted to keep the questionnaire short because the respondents filled it out during the conference. My aim was to avoid the feeling of being overwhelmed with the number of questions and their complexity (Converse and Presser 1986, 27; Fowler 1995). The questionnaire was in Slovak as it is the first language of the mayors and mine as well. It was only during the conference that I was able to do this part of research. The mayors knew about this research activity beforehand as it was mentioned in the official program of the conference that was distributed approximately a week before. I received three more questionnaires via email when one of the conference attendees offered to distribute them and collect responses from the mayors he works with.

Together I gathered 39 filled questionnaires that I summarized into percentages through a mathematical formula.

4.3.2. Interviews

The interviews were arranged upon mayors' willingness to participate, by filling out a contact form that I distributed separately from questionnaires during the conference. In addition, I tried to contact mayors from the regions who did not attend the conference. The contact form informed them about my interest in their opinion on water governance as well as about the type of the interview. It was only possible for me to conduct interviews over the phone due to time and resource constrain. Once I was able to set specific date and time for the interview, I informed the interviewee about my research and got consent to record the interview through an app on my phone. Some of the mayors chose to answer anonymously. The interviews were structured, and I asked the same 17 questions in each interview with slight variations depending on the particular situation in municipalities (see Appendix B: Interview questions).

The interviews were about 30 minutes long, and I transcribed all of them completely. I worked with approximately 12 thousand words. After I had completed the transcription, I followed the book *InterViews: Learning the Craft of Qualitative Research Interviewing* by Steinar Kvale and Svend Brinkmann (2009) in order to code my interviews. I took into consideration the concept of adaptive (co-) management and created categories in accordance with the different institutional prescriptions of this concept. The main results of my study are the connections between the findings and categories and the link to the general idea of applying resilient thinking to water management.

4.4. Limitations

The two Slovak regions, I chose as cases to study water management in regards to flooding, have unique circumstances through which I can showcase the management and apply the chosen theory. Certainly there are limitations connected to my choices. Although these cases are significant, the generalization to the whole state can be quite problematic as other regions can be in a slightly different situation. However, I do not consider this as a problem since my

aim is to study how adaptive the water management in Slovakia is. Whether it is more or less adaptive should be also visible through analyzing limited number of municipalities. This research is only a part of a bigger picture that needs to be analyzed, in order to get more holistic perspective.

Furthermore, I chose to keep the identity of the mayors in anonymity that prevented me from using specific information about their municipalities. Even though including the information about the municipalities could strengthen my analysis, I chose not to incorporate it because of the sensitivity connected to talking about how the state manages water and possible repercussions the mayors could face as a consequence. For these reasons, I was also able to have only limited number of interviews.

4.5. My role as a researcher

The insider and outsider debate made me reflect on a couple of issues during my research. I am Slovak which makes me an insider at least when it comes to the language. However, I kept changing the feeling of being insider and/or outsider during the research. I moved out of my home country when I was 16 and have lived in other countries since. I have remained interested in the inside matters in Slovakia, but my international experiences constantly shaped the lenses through which I made sense of the happenings. Most of the reflections about my positionality are tied to my interviews and the conference I attended. For instance, a mayor agreed to make an interview with me through an email, but when it came to telephone communication I got turned down. He expressed mistrust in me and was not willing to discuss certain issues over the phone. However, I understood where he is coming from. Although water governance may not seem as ethically sensitive issue at first, in Slovakia any discussion and expression of an opinion about government on rather official ground, which an interview with a stranger is, is ethically sensitive. For some of the interviewees I was an insider and for some I was an outsider which had its effects on their answers. Throughout my thesis the changes between my role as the insider or the outsider are visible but I tried to take the advantage of having the inside knowledge of culture and situation in Slovakia while keeping in mind my role as a researcher.

5. Water management in Slovakia

In this part of my thesis, I will present the secondary as well primary data followed by the analysis. I gathered this data as means to answer my research questions. The aim of the first part, the secondary data, is to provide a reader with more detailed information about the revitalization program. It is a core point in comparing the current governmental approach to the water management with the previous one. The secondary data presented in this section refer to the general introduction to the Slovakian context. Next, I present my primary data: the results from the questionnaires and interviews. I intend to enrich information gathered from secondary data research with new and original data that were not accessible prior to this research. The findings in this section provide a detailed picture of the mayors' perspective about the water management in Slovakia and how it affects different municipalities. In the following part, I analyze all the findings in accordance with the concept of the adaptive (co-) management with an aim to identify the most problematic areas that prevent the current water management from being adaptive thus resilient. This analysis is especially important in order to answer my research question that I will do in the conclusion.

5.1. 'Landscape revitalization and river basin management programme'

On October 27th, 2010, the Slovak government approved to implement the revitalization program. This program created joint responsibility for: a. flood risks, b. drought risks, c. land erosion by water, d. transparency, e. economy, f. innovation, g. synergy and sustainability in water resource usages, river basins and stewardship of the country (Úrad vlády Slovenskej republiky 2012a). The government created the program as a response to severe floods in 2010. The aim was to revitalize damaged parts of the country through restoration of its retention capacity¹⁰ (Kravcik et al. 2012, 12). The government adopted a three-step approach; rainwater harvesting in the place where it falls, retention of this rainwater and only after that passing this water further downstream (Úrad vlády Slovenskej republiky 2012a). During the first round of the program, a total of 833 municipalities applied for the program. 200 municipalities were considered from which the government signed a contract with 190 of them (Ibid.).

¹⁰ Landscape's ability to hold water

The first round of the program had impacted municipalities in several areas. It created approximately 3500 seasonal jobs for unemployed people in regions where unemployment presents a serious challenge that consequently created significant social change (Kováč 2011, 3). The job seekers had a chance to protect their municipality against floods that contributed to the loss of their frustration with feeling socially redundant (Ibid.). Communities turned their attention from fear and insecurity regarding next flood wave to mutual discussion on how to resolve the issue of protection from the flood wave. Mayors of different municipalities also praised the criteria for efficient use of financial means, which were precisely given, thus were more transparent than during previous projects (Úrad vlády Slovenskej republiky 2012b, 1). Municipalities started to implement the projects before the summer rainy period that significantly contributed to the protection of the municipalities against local flooding (Ibid.). Other advantages identified included elimination of illegal dumps and creation of new attractive zones for the development of tourism (Ibid. 2). The results achieved supported this strategy and created the basis for the development of the second round of the revitalization program.

Overall in the period from 2010 until 2012, 485 municipalities took part in the revitalization program, 7700 seasonal jobs were created, and about 100,000 of different water retention elements were implemented especially in the upstream areas of the basins (Kováč 2011, 10). Over time, part of the water management community started to oppose the program, and current government decided not to continue the program.

The present government decided not to create any new project with similar aims as the revitalization program, rather concentrate on water management through the Ministry of Environment thus SWME (OPZP 2014, 4). The revitalization program was an additional project to the regular strategy of the Ministry that emphasized small-scale solutions. The current strategy for ‘sustainable development’ of SR according to the Ministry includes aims to tackle flooding. However, the Ministry prefers to approach the water management through the centralized structure (OPZP 2014, 48). I will analyze the experiences of different mayors with this approach in the later sections. I will not evaluate hydrological effectiveness of these diverse approaches to water governance. Instead, I will focus on various characteristics of the

water management in order to evaluate if this management in Slovakia comes close to the adaptive (co-) management.

5.2. The story of water in Spiš and Šariš

On March 18th, 2015, I attended the first working session called ‘Action plan for integrated development of Spiš and Šariš’. The aim of this meeting was to create a common platform for development plan based on utilization of regional potential. The conference kicked off with a story about a village called Tichý Potok¹¹, followed by several speakers who concentrated on the importance of water in their respective fields e.g. fisheries, forests, biodiversity, biomass, birds and more. It was very informative part of the session. However, I also started to notice boredom among attendees. Then there was a coffee break. Surprisingly for me, almost one-third of the participants packed and left during the break. I could not resist but to feel disappointed. After the break, the main organizer, Michal Kravcik, from the NGO ‘People and Water’ stood up and called people to action emphasizing that only if they approach their problems collectively as mayors they will succeed. In the end, one of the mayors read a memorandum that they passed around to sign. The signatories agreed to meet again in approximately one month period and continue this action plan and discuss concrete steps to be taken. Almost all of the mayors, who stayed after the break, signed the memorandum. After the session had ended, I stayed for a while and talked to a few mayors. One of them asked me, what I thought about this meeting and I replied that I had mixed feelings and did not understand why so many people left during the break. She explained it was about money. Those who left realized there will not be any budget that would be divided between mayors and then they could decide how the money would be spend. Not once was water referred to as a strategic resource or economic commodity during the whole session.

¹¹ Story of Tichý Potok: After the fall of the Soviet regime, Slovakia faced many challenges including reorienting from centralized power structure to democracy. In 1992, the Slovak government decided to build a large dam at Tichy Potok in order to supply drinking water for cities in the Eastern region (Ziegler et al. 78). However, this dam would destroy the natural rural environment and forced four 700-year villages to evacuate (Ibid.). After intense public pressure with the help of the grassroots organization, People and Water (*Ludia a voda*), the Minister, who proposed the idea, backed down. Since then, the focus has been on preserving the regional cultural heritage while providing environmentally sensitive economic development (Ibid.). These efforts also became known as the *Blue Alternative*. Furthermore, a new paradigm called New Water Paradigm emerged (Ibid.).

During the meeting I distributed short questionnaires with questions about water management, floods, and revitalization program which took place in 2010-2012. Out of the approximately 50 mayors, who attended the conference, 36 answered and returned the questionnaire. Some of the mayors asked me what the aim of my study was and why I was doing it. As I explained it, I received mixed reactions. For some, it was strange to do a study on water from social science approach and not hydrological, on the other hand, others were pleasantly surprised and wished me good luck. These reactions reflect the current situation of prevalent technocratic approach by government to water, but at the same time realization that water is much more than liquid with some monetary value. When I came up to the first group of mayors with my questionnaires one of the mayors said: “My si našu vodu nedáme!” with a smile on her face. It translates into; ‘we will not give up our water’. The broader meaning of this sentence is; we will not export our water (given recent debate in the Parliament) and we want to protect it. The phrase is commonly used by people from different fields to indicate the state of current situation when one group of people defends the idea of selling the water and the other one sees water as heritage which should be protected.

5.2.1. Questionnaire results

The aim of the questionnaire was to research general data about water from perspective of the mayors in the regions of Spiš and Šariš (see Table 5.1). The first group of questions was about general state of water management in different municipalities i.e. how much time mayors devote to water management during their workweek or in general how important is water for them. The second set of questions was about floods. I aimed at getting statistics about flood occurrence and if municipalities implemented any preventive actions. However, the most important questions in this section were about mayors’ view on efforts in flood prevention taken on national level and whether the cause of floods can be attributed to political mismanagement. In the first issue, mayors clearly expressed their dissatisfaction with flood prevention efforts adopted by Slovakia where all of the respondents marked the same answer. In the question about possible cause of the floods, 29% of the mayors attribute floods to heavy downpour and 29% to political mismanagement. In my interviews, I attempted to research these areas in greater detail in order to get a picture of mayors’ experiences with current state of water management. The last part of the questionnaire was about revitalization program. I wanted to measure mayors’ satisfaction with the program and possible interest in similar project in order to get a clearer view about their satisfaction or dissatisfaction with the

different approach to water management than the current one. The questionnaire is not the main part of my research, however, still provides useful data that were not accessible through secondary literature sources (on the specific regions).

Table 5.1: Summary of the numerical results from the questionnaires

Water management:	
How many hours do you dedicate to water management per week?	
1 to 10	69%
11 to 20	15%
21 to 30	8%
31 and more	8%
Is the sustainability of drinkable water resources priority in your work?	
Yes	74%
To certain extent	18%
No	8%
Does water represent an opportunity for economic development in your municipality?	
Yes	90%
No	10%
Do you have any problems with the supply of drinkable water in your municipality?	
Yes	28%
No	72%
If you answered yes to the previous question, how serious is this problem? 1 = little serious 5 = very serious	
1	10%
2	0%
3	40%
4	10%
5	40%
Floods:	
To what do you attribute floods in general?	
<i>Choose one option that you think is the most appropriate</i>	
Heavy downpour	29%
Natural phenomena	16%
Greenhouse effect	8%
Political mismanagement	29%
Other	18%
Has your municipality ever experienced floods?	
Yes	87%
No	13%
Has your municipality taken preventive action against floods	
Yes	84%
No	16%

Do you agree with this statement; Slovakia's efforts in flood prevention are sufficient given the current state of the economy?	
I agree	0%
I disagree	100%
Landscape Revitalization and Integrated River Basin Management Programme:	
Have you heard about revitalization program which took place from 2010 until 2012?	
Yes	82%
No	18%
Did your municipality take part in this program?	
Yes	69%
No	29%
I do not know	8%
If yes, in which areas did the program help your municipality? <i>Check all that apply</i>	
Employment	Checked 17 times out of 24
Flood prevention	Checked 22 times out of 24
Economic development	Checked 6 times out of 24
Environment	Checked 11 times out of 24
It did not help	Checked 0 times out of 24
Other:	Checked 1 time: badly done
Would you be interested in taking part in such a project? Whether your municipality participated before or not	
Yes	95%
No	5%

5.2.2. Interviews

I narrowed down my research to the effects of the current state of water management on the local level. For this purpose, I interviewed five mayors from different municipalities within the two regions, Spiš and Šariš. I attempted to interview more mayors but due to their time and resource limits as well as mine, I ended up with five interviews but with similar findings from all. The results of my interviews provide a picture about participants' perspectives on the water management in Slovakia and their main struggles in this area. I grouped the responses together according to different themes that appeared in all of them, and because there were no contradictory answers to my questions. I kept the identity of the mayors as well as the names of the municipalities anonymous, since water management can be a sensitive issue. This section is divided into four parts that I determined according to the theory of adaptive (co-) management: polycentric governance system, public participation, experimentation, and the bioregional perspective. All of these sections are interconnected, and it is impossible to make a clear divide. In my analysis part, I will connect the findings with the theory on the

institutional prescriptions under adaptive (co-) management in order to determine the effects of the current state of water resources management on different municipalities.

5.2.2.1. Water management as polycentric or monocentric governance system

One of the very first questions, I asked in the interviews, was to describe the state of water management in a municipality with regards to challenges and problems they are currently facing. Although, the actual problems ranged from lack of water supply infrastructure to floods, all of the mayors linked these problems to the allocation of power which is not in their hands. They either refer to the state as the one responsible for solving the troubles the municipalities are facing or to the basin management, the SWME. In one of the interviews, a mayor was not able to identify who is responsible for basin management as there were multiple changes in the cadastre. Another mayor knew who is responsible for taking care of the river, but gave up on an idea that the necessary maintenance will be done by the state enterprise:

“Our streams had problems because they needed to be cleaned. It was not a lot, about 200 to 300 meters. The state should take care of this as the administrator of the basin, but they [the SWME] somehow do not have the time. I tried to call them and get them to do it but in the end I did it myself. It was not such a big and expensive problem, and finally the problems were over.”

Throughout all the interviews, mayors referred to the centralized power allocation as an obstacle in their efforts to solve their immediate problems with water. For example, they are not permitted to take preventive measures against floods. These measures are usually done on small streams which only affect the individual municipalities so are often overlooked by the SWME. This problem is of legislative character as one of the interviewees describes:

“The state is the administrator of the river basins and, in fact, does nothing in the basins. It only concentrates on two things in water management activities; the most important [the biggest] rivers and water dams. Everything that is outside of these activities so the small streams and rivers, the state does not even have the strategy, money or willingness to deal with.”

They said that the decision-making is centralized far away from the mayors. Some of the interviewees made suggestions to decentralize the power, as well as the funds. Since the countryside where all the water accumulation and floods happen does not get enough funds to deal with it.

On the topic of polycentric system, mayors suggested the expansion of competencies and responsibilities over water management to other bodies such as forestry and agriculture. They acknowledged the complexity of water management problems and how they affect a vast range of areas. They would welcome official set of rules and responsibilities that would apply to all the respective institutions and bureaus. Overall, the mayors pointed to a wish for better cooperation between municipalities, experts in water management, and the SWME especially in taking preventive measures rather than solving problems after they already happen.

5.2.2.2. Public Participation or the lack of public participation

In short, public participation can be described as the collaboration between governmental and non-governmental stakeholders. As indicated in the section above, the mayors face difficulties in expressing their concerns on the official ground, and they are part of the hierarchical structure in water management. There are official channels citizens or NGOs can use in order to express their dissatisfaction with the current state of affairs, however, this is only one part of public participation. The other part is about public involvement in planning and decision-making phases.

Although the theme of public participation appeared in the interviews less than the polycentric system, all of the mayors referred to it. All of them at some point said that the state should more communicate with the people. One of the mayors expressed this suggestion in connection with a technocratic project that the state will implement in few years time. The others mentioned public participation as a response to one of the last questions when I asked what should change in their opinion about the current state of the water management:

“[The state] should communicate with people, the citizens, about what are the problems they are facing, what needs to be done and what does not.”

A mayor went into more detail in the question about what should change especially about the public participation:

“But I think that people’s opinions should matter more. The environmental voices are always in the background, and the state advocates for the stronger side, those [construction] lobby groups.”

5.2.2.3. Revitalization program as an experiment

The next institutional prescription that is used as point of reference to present the findings is experimentation. Although it can be methodology itself, the focus is on experimentation as an approach to management concretely acknowledging the limited knowledge we have and learning from experience. In the interviews, I asked a couple of questions about revitalization program that represents the different approach to water management than the one that the government currently implements. One of the mayors was from a municipality that did not participate in the program because this municipality did not have any troubles with water during the years when the revitalization program was implemented. Thus, his answers did not match the experimentation category. However, the mayor still expressed interest in a project with different approach to water management.

All of the mayors, except the one who did not participate in the program, had a positive experience with the revitalization program. The reoccurring aspect was the satisfaction with employing people who were usually unemployed for longer periods of time. The mayors also indicated how this helped with the inclusion of such persons into the whole community of a municipality. One of the mayors said:

“Regarding the employment, it [the revitalization program] was certainly a contribution and also in regards to the relationship of people to the municipality, [...] and to the overall environmental education. They [the workers] were proud to build something that protects the others. [...] I certainly evaluate the program positively from the labor and environmental perspective.”

The only disappointment the mayors indicated in regards to the revitalization program was that it was canceled. In connection to the employment, the mayors also mentioned the positive effects of this program on flood prevention caused by the small streams or rivers in their municipalities. Furthermore, these types of landscape interventions are preferable for the mayors in comparison to the big concrete dams.

5.2.2.4. The bioregional perspective

The bioregional perspective argues for complex water governance on the watershed level either as cooperation at the river basin level or as a call for unitary river-basin authority (Huitem et al. 2009, 11). Since this research concentrates on effects of water management on the municipal level in two Slovak regions, the bioregional perspective seems as less applicable because of its scale. However, it was still possible to identify experiences the mayors talked about in the interviews that are connected to the bioregional perspective.

Structurally, Slovak rivers are divided according to the basins into branches (see the structure of the SWME in Appendix C). The mayors' experience with this structure is presented in the polycentric governance system section (5.2.2.1.). In addition, one of the mayors has mixed feelings about one future project. The SWME is planning to build a dry dike in the region in order to protect cities down the stream from floods. However, the mayor is concerned with the effects this project will have on the municipality as the dike will be built below the municipality and the mayor was not included in the decision-making process:

“Now the SWME came up with an idea to construct a dry dike below the village. It will be 11 meters high and owned by the SWME. The dike is supposed to catch the flood wave but will not protect my municipality only those down the stream.”

6. Analysis of the data

According to the theory of resilience thinking and consequently on adaptive (co-) management, water resources should not be managed in isolation rather the complexity of ecological as well social systems should be recognized (Huitema et al. 2009, 3). The focus of this research is on four institutional prescriptions of adaptive (co-) management of water

resources. In this section, I will analyze the findings from my questionnaires and interviews in reference to the theory. The aim of this section is to identify the effects of the current state of water management on the municipal level and how the previous different approach to water management contributed to these effects.

6.1. Monocentric governance system

Polycentric governance means dispersion of power among different bodies with overlapping jurisdictions (Skelcher 2005, 89). In adaptive (co-) management, focus on polycentric systems is to facilitate collaboration between the various bodies. For the purpose of resolving and preventing coordination problems, fostering trust, and keeping transaction costs manageable as well as ensuring democratic legitimacy (Huitema et al. 2009, 5-7). Addressing all of these in connection with water management in Slovakia would be a project in itself. Based on the data, it is possible to identify certain aspects of the current governance system in Slovakia in regards to water.

The current structure of water management is centralized to the Ministry of Environment as the main decision maker. The Ministry employs hierarchical structure with having SWME as the administration body for water management which is further divided into branches according to different river basins (see Appendix C: Structure of the SWME). There are also other organizations in the forestry sector which oversee the administration of certain streams. This structure fits more with the monocentric system rather than the polycentric one given the hierarchical relationship between different institutions. However, this does not imply that the system is less effective as there is a lack of research to draw this type of conclusion. In addition, research that attempts to link ‘polycentricity’ with the performance of the bodies is rare and plagued with difficulties (Huitema et al. 2009, 6).

The mayors, I interviewed, identified the current division of power as problematic. It stands as an obstacle in their efforts to take preventive measures against regular flooding. In contrast to the revitalization program that emphasized the local solutions to the floods caused by the small rivers. It is not to say the mayors have no power over water management in their municipalities. However, they are at the bottom of the hierarchical structure. It is challenging

to solve particular geographic problems from their position as the attention of the SWME is on the overall situation. One of the geographically specific issues in the regions of Spiš and Šariš is the flooding. As shown by the results from questionnaire, 87% of the mayors indicated that their municipality has experienced floods while 84% implemented a preventive measure(s). There may be several explanations for the difference in the percentages. However, as one of the interviewees who did not take a part in the revitalization program indicated, the problems with flooding in the municipality have only begun three years ago. Thus, the municipality was not an eligible candidate for the revitalization program but the current water management is not helpful in solving the situation as it does not adapt to this type of uncertainty of the future.

The suggested (by the mayors) institutional diversity offers considerable advantages especially when complex and uncertain problems need to be addressed. The polycentric governance system is supposed to be more resilient thus better at coping with change and uncertainty (Huitema et al. 2009, 5). The potential advantage of this system in the Slovak context would be the ability to address issues at different geographical scopes through management at various scales. However, it is important to keep in mind that the current water management structure has developed over a long period. I do not intent to suggest designing new institutions from scratch as it may be too challenging. Moreover, it is impossible to predict with any degree of certainty how such institutions would work out in practice (Huitema et al. 2009, 13). Rather, based on the mayors' experiences the current institutional design calls for adjustments and careful experimentation with more emphasis on learning from experience.

6.2. Lack of public participation

None of the institutional prescriptions discussed in this thesis can be analyzed in isolation from the others. Public participation ties back to the polycentric (or monocentric) system of water management. In this thesis project, public participation is referred to as the collaboration between governmental and non-governmental stakeholders. Under adaptive (co-) management, the question is how to ensure public involvement in any experiments or research and how to organize follow-up to the participation (Huitema et al. 2009, 15). Each of the institutional prescriptions could be a project in itself, and the public participation is no

exception to this. The aim of this study is to describe this prescription through the municipal view. Given the hierarchical structure of water governance in Slovakia, mayors' views on the issue help to identify the problematic areas within this prescription because they are the closest official actors to the public in this hierarchy.

In the interviews, the mayors talked about the lack of public participation in water management, in particular, in identifying the problems in hand and possible solutions. As a Slovak citizen, there are official ways how to express concern with any matter, such as issuing an official complaint or creating a petition, and similar. However, the public participation is not only about complaining about already made decisions, but also about including the public in the initial phases. The public participation (in water management) depends on willingness and ability of authorities to organize the involvement and also on the willingness of potential participants to actually participate (Huitema et al. 2009, 15). In general, mayors agreed the public is in no way included in the decision-making phase about water management.

Non-governmental stakeholders can also be NGOs or similar types of organizations representing the civil sector. However, only one of the mayors mentioned the importance of including voices from environmental organizations in water management. One NGO that is particularly active in water governance issues in Slovakia is People and Water, which also helped to organize the conference I attended. The chairman of this organization, Michal Kravcik, was the executive manager of the revitalization program. Since the program got canceled, so did the cooperation between governmental and non-governmental institutions in regards to water management. Due to the lack of room for NGOs to participate in water management, the aim of the conference was to mobilize mayors to act without waiting for the official bodies to take action.

There is a strong body of literature arguing for the vast variety of advantages of public participation (Huitema et al. 2009, Mostert 2003, Ridder et al. 2005, Reed 2008). However, the state of public involvement in water management in Slovakia is still under development. The reasons vary where history and culture play their role. Based on the data presented in this project, I conclude that water management in Slovakia lacks the public participation aspect

that makes the management rigid thus inflexible in adapting to changes and uncertainties. On the other hand, through inviting other voices to participate in water management it would become more transparent and democratic, but the connection to the formal decision process needs to be clearly specified (Huitema et al. 2009, 15).

6.3. Experimentation

Experimentation as management is supported by governance literature only when it is about small scale experiments¹² (Huitema et al. 2009, 15). There are difficult areas that stand as an obstacle to accessing whether experimentation is feasible institutional prescription. It is often difficult to implement experiments because of equity concerns and by the time the experiment may be finished the political landscape is transformed (Ibid.). In this project, I view revitalization program as form of experiment, although, it does not fulfill all the criteria to be called an experiment. My emphasis is on learning from experience aspect of experimentation based on the experiences the municipalities have.

According to the mayors the revitalization program had many advantages in form of flood prevention (checked 22 times in the questionnaires), employment (17 times), environment (11 times), and economic development (6 times). In the interviews, mayors talked mainly about the labor advantages, where the program resulted in the greater social inclusion of people, who were seen as community outcasts, and flood prevention. The adaptive (co-) management emphasizes the notion of limited knowledge of socio-ecological systems (Huitema et al. 2009, 3). Through careful experimentation, this knowledge can be accessed in the form of learning from experiences. Although the knowledge from an experiment does not have to result in new policies or a different way of to manage water, it can enrich future decision-making process in this field (Huitema et al. 2009, 11).

Whether the revitalization program was successful or not is difficult to measure. However, the point lies somewhere else. The positive as well as negative aspects of the program should not be forgotten even after its cancelation. It does not have to necessarily result in a similar

¹² Huitema et al. (2009) came to this conclusion after they done an extensive literature review on governance.

project although, 95% of the mayors who attended the conference expressed an interest in such a project. Instead, the decision-makers should take an advantage of the lessons learned and the gained knowledge about socio-ecological systems. Experimentation presents a useful tool for accessing this knowledge that in turn adds to the better ability to deal with future changes and uncertainties of the water management in Slovakia.

6.4. The bioregional perspective

There are more problematic areas that need to be addressed before moving to bigger scale. The water management has to be integrated on the small scale in order to have successful management on the watershed level (Pahl-Wostl et al. 2008a, 421). However, the bioregional perspective is necessary as it can address the complexity of ecosystem on the appropriate scale. It should move beyond administration boundaries. The governance literature reflects the power asymmetries present in river basins that are more dominant than the ecological considerations (Huitema et al. 2009, 11).

Most of the Slovak rivers flow into the Black Sea (96%) (Kris and Skultetyova 2009, 534). Since a lot of these rivers stem in the Slovak mountains, the bioregional perspective calls for collaboration of different basins along these rivers that would ignore the administrative borders between countries. The data gathered through questionnaires, interviews, and literature are not sufficient to draw any concrete conclusions about bioregional perspective. However, the construction of the dyke, one of the mayors expressed concerns about, will certainly affect the stream of the river and consequently the whole basin. Furthermore, I can only stress the importance of cooperation on watershed level between different river basins based on ecological considerations rather than administrative ones (Pahl-Wostl et al. 2008a, 422).

In the analysis of the findings from the interviews and questionnaires, I tried to find out the relations between institutional prescriptions of the adaptive (co-) management and water management in Slovakia from the municipal perception. Detailed analysis of each of these prescriptions is needed in order to assess how adaptive the current Slovak water management is, however, the aim of this thesis is to create an overall picture on the surface level of this

analysis. The first two prescriptions have problematic areas, according to the mayors, that should be addressed in order to achieve more adaptive (co-) management which would be able to adjust to unknown changes in social as well as ecological systems. The other two prescriptions are rather suggestions about areas which should be considered, for example, ways and tools how to achieve the adaptive (co-) management. The Slovak water management shows signs of 'command-and-control' paradigm which is not compatible with including a wider range of potential trade-offs at different scales in space and time. In the next section, I will discuss how the empirical case of water management in Slovakia in context of floods in the two regions connects to broader theoretical discussions especially to notion of managing change towards adaptive (co-) management and global water management.

7. Discussion: from local to global water management

The importance of water management started to grow with increasing urbanization and intensified agriculture. In order to protect cities and agricultural land from flooding, rivers were artificially controlled (Pahl-Wostl et al. 2007, 1). The technological fixes to these challenges proved to be efficient enough in short-run (Ibid.). However, these fixes were identified and dealt with in isolation to long-term consequences. The system design was based on high predictability and controllability determined by experts from the natural sciences background (Ibid., 2). In the past two decades new, more integrated, approaches to water management received more attention. This increasing awareness about the complexity of the social-ecological systems inspired many researchers, for instance, Pahl-Wolst, Huitema, Walker and Salt, and more. They discovered major knowledge gaps in several areas that prevent successful implementation of new paradigm of water management.

In addition to limits of the old water management paradigm which counts on the predictability of system behavior, new concepts such as resilience, vulnerability, and adaptive capacity need to be considered. These types of concepts can help to characterize different water management regimes. However, it requires integration of complexity and unpredictability of policy and social learning processes (Pahl-Wostl et al. 2007, 3). Ideally, implementation of water management in a river basin should take into account its political, economic, and social realities (Ibid.). It calls for open dialog between scientists and policy makers. The old

paradigm of water management evolved over decades; thus, the transition to new one will take some time (Ibid., 4).

In this empirical study of water management in Slovakia, I discovered in what state different institutional prescriptions are and the most problematic areas in accordance with the theory of adaptive (co-) management. The importance of concentrating on adaptive (co-) management lies in aiming at achieving integrated and sustainable water management that would be able to deal with today unknown challenges and uncertainties without counting on predictability of these events (Pahl-Wostl et al. 2007, 1). Furthermore, this type of management refers to resilience thinking about water resources management. The emergence of this approach to water management comes from a need to recognize the broader socio-ecological systems (Walker and Salt 2006, 31). Without this recognition, any talks about sustainable water management become irrelevant.

Slovakia is a post-Soviet country. The Soviet regime was characterized by the concentration of powers in one central body that was identified as an obstacle to achieving resilience in water management (see parts about the polycentric governance system). Although Slovakia has come a long way in transitioning into a more democratic state with decentralized power to different parts of society, my empirical study reveals traces of the past regime in the case of water management. Any transition to a new regime is a long-term process, and water management is no exception. This thesis project deepened understanding of what are the areas that need attention in managing change towards more adaptive water management in the context of Slovakia and possibly post-Soviet countries.

Huiteima et al. (2009, 15-16) suggests multiple venues for further research in the area of adaptive (co-) management. There is still a lack of empirical research which would determine the effectiveness of different institutional prescriptions. This thesis project was too small to draw concrete conclusions in regards to the effectiveness of the four institutional prescriptions. Nevertheless, it certainly identified the need for a different approach to water management based on the problems the mayors experience in the area of flood control and prevention. Preferably, the new approach should be in accordance with resilience thinking in

order to aspire for the sustainability of water resources management. I analyzed problems that are embedded in the context of Slovakia and the two respective regions in order to support the idea of context-dependent solutions instead of defaulting to simplistic generic recipes. This approach to my research embraces complexity and context dependence.

There are multiple levels at which water management or governance can be analyzed. I focused on the local one. However, it does not fully do justice to the complexity of water issues. Although water problems are local thus should be handled on the local scale, they are linked to national and basin levels. These different scales of water issues are not mutually exclusive, and their interlinked relationship should be recognized and put into perspective of a global water system (Pahl-Wostl et al. 2008a, 421). The global level of water management is the least explored aspect (Ibid.). The need to focus on it more alongside to the other ones is linked with a particular kind of phenomena transforming the contemporary global water system that requires particular type of policy response (Ibid. 422). For example, the hydrological system is global where patterns or phenomena relate to each other across vast distances (Ibid. 421). Also, water related problems and conflicts go often beyond borders of national or basin regimes. Even the local water issues are part of the global dynamics i.e. construction of a dam leads to fragmentation and flow alteration of the river basin (Pahl Wostl et al. 2008a, 422). Whether an issue lies within local, national or basin level of management, there is still need for greater global understanding and better coordination of activities on global water management. The lack of global coordination in water related issues allows for short-term fixes of local problems with often irreversible effects on associated freshwater ecosystems (Ibid.).

Ecosystems include social systems as much as the ecological ones. Water related issues constantly shape these systems in unknown ways due to the high level of complexity of the systems (Walker and Salt 2006, 37). Natural and human environments cannot be studied in isolation to each other given their mutual interconnectedness (Robbins 2012, 14). Research about water management has to include political, social, economic as well as environmental aspects in order to attempt to fill in the knowledge gaps created by long-term prevailing specialization on hydrological or engineering approaches to water management (Pahl-Wostl et

al. 2007, 1-2). In this research, I looked at decision-making (power) about water in Slovakia which affects different societal aspects (culture and sustainability).

There are many ways how to study water management, and the empirical study of the Slovak one is no exception to this. The scale of the debate about water management is multifaceted even at the local level. In order to generate achievable policy strategies with regards to water management, further research has to be conducted. The further research could include different approaches thus add to the current gap in the literature about water (management) in Slovakia. Additionally, even within the theoretical framework used in this research, there are still areas that could benefit from further research in order to create complete and detailed picture. Each of the institutional prescriptions could be a research on its own. Also, during my interviews two issues came up which I was not able to incorporate fully into my analysis; money (distribution of the budget) and private property ownership. If I were to make further research into this topic, those would be the aspects I would look into more. Overall, Slovakia represents valuable case study for water management because of its geographical characteristics, where water management can be studied while there is enough water in the system, and specific political, economic and social composition that has characteristics of a post-Soviet country.

8. Conclusion

The study was set out to explore the importance of resilience in water management in Slovakia. I started with a general interest in context of the water situation in Slovakia and found appropriate theory and concepts to study this particular area. I asked research questions about the resilience of the water management in Slovakia and about the most problematic areas preventing the management from having the ability to adapt to future unpredictable changes and uncertainties. The general theoretical literature on this subject and specifically in the context of Slovakia is inconclusive on several vital questions within the water management discourse. I sought to answer two research questions:

1. How resilient is the water management in Slovakia in regards to the municipal scale?
2. Which areas of the management are the most problematic in accordance with the adaptive (co-) management?

For this purpose, the focus was on experiences of the mayors, from different municipalities located in two regions, with flood control and prevention under centralized water management.

The political ecology served as the overall analytical framework for the empirical study about the water management in Slovakia. According to the political ecology, water management involves recognition of interconnectedness between human (mayors and citizens) and non-human (floods) aspects (Robinson 2012, 3). Furthermore, according to the concept of hydrosocial cycle, water issues are socially constructed (Swyngedouw 2013, 828). Thus, they reveal the unequal political and economic power. The mayors, who participated in this research, certainly experience these inequalities in efforts to deal with the hazards water poses for them. Through the theory of resilient thinking, I challenged the socially constructed political mismanagement of water in Slovakia. The concept of adaptive (co-) management helped me to point out the most problematic areas which are preventing the Slovak water management from achieving any degree of sustainability.

The concept of the adaptive (co-) management refers to four institutional prescriptions according to which I analyzed the empirical findings. In this section, I will combine the empirical findings to answer the study's two research questions. I will start with the most problematic areas of the water management in Slovakia.

- a. **The current monocentric system of water management is not sufficient for addressing municipal challenges with flood control and prevention.** The hierarchical relationship between different governing bodies, which are responsible for the control and prevention, prevents the people who are affected the most by the flooding from taking the desired action. The monocentric style does not necessarily imply it is less effective. However, according to the mayors, this style of decision making about water matters in Slovakia is not able to adapt to specific challenges they face.
- b. **There is a lack of public participation in the water management in Slovakia.** The citizens in different municipalities are not included in the decision-making process about flood control and prevention. It prevents the water management from dealing

with specific problems the citizens experience with the flooding from which the governing bodies could benefit. The inclusion of other voices (e.g. citizens and NGOs) into the decision-making process would make it more transparent and democratic as well as flexible and adaptable.

- c. **The decision makers about water management do not stress enough learning from experience through experimentation.** The revitalization program had many advantages according to the mayors. Additionally, many mayors would be interested in taking part in a similar project. Through taking lessons learned from the revitalization program, the decision makers could access new knowledge about socio-ecological systems that could help them in adjusting the water management to be more resilient.
- d. **Since a lot of rivers stem in Slovakia, the water management connected to these rivers affects the water situation in other regions and countries. This notion is not sufficiently incorporated to the current water management.** According to the general theoretical literature, there is a lack of global water governance. Perhaps, more attention should be given to the global perspective in Slovakia because of the geographical and water characteristics. However, this is a challenge everywhere in the world which calls for better cooperation on water matters between countries which would not be determined by the administrative borders.

The overall research question of this study relates to how resilient the water management in Slovakia is. According to the conclusions based on the empirical findings, I conclude that current water management is not sufficient in regards to resilience thus, it does not acknowledge the complexity of the socio-environmental systems fully. The ‘command-and-control’ paradigm remains dominant, where the water management includes mostly opinions of engineers with technical expertise in hydrology. Managing water and climate, in general, through thinking about it as predictable element does not cover other aspects (social, natural, economic, and similar) on which it has potential long-term undesirable consequences. If the water management in Slovakia stays this rigid and inflexible in responding to unknown changes in socio-natural systems, the difficulties people and mayors face in the area of floods will continue. The way forward in creating water management that would be more resilient includes rethinking of the four institutional prescriptions with particular emphasis on

acknowledging the gaps in knowledge which can be filled with, for example,. learning from experience.

The main contribution of this study lays in the critical perspective of the water management in Slovakia. It also adds to a body of empirical cases that employ the theoretical perspective of the resilient thinking. Not only is it important to enrich water management literature with different theoretical perspectives such as resilient thinking, but also to acknowledge the need for the rethinking of the current water resource management paradigm. This study offers evaluative perspective on the management of a resource that is vital to the life of people as well as ecosystems. Furthermore, this empirical study contributes to the literature about the sustainability of the water resource management as it took into account the features of unpredictability and uncertainty of the future in the choice of the theoretical framework. Although, some scholars argue for different strategies toward sustainable future of the water such as market environmentalism (Rogers et al. 2002, Shirley 2002, Winpenny 2003, Dinar 2000) or human rights (Shiva 2002, Assies 2003, Barlow and Clarke 2002, Petrella 2001), this study underlines the need to consider different alternatives for water management which is in accordance with the view of water as common pool resource (Heikkila 2004, Leonard et al. 2015, Wutich 2009, Deneke n.d., Schluter and Pahl-Wostl 2007, Bakker 2012). The alternatives mentioned in this study may not be applicable in the same way everywhere rather the emphasis is on considering the context according to which appropriate strategy can be determined.

Despite of all the difficulties and challenges the water management faces in Slovakia, it is possible to make adjustments which would make it more resilient through willingness and desire. It is not plausible to predict concrete benefits of these adjustments, now. However, they would certainly positively affect the social, economic, political and environmental situation in the municipalities that are currently almost powerless in trying to deal with the immediate challenges water poses for them. It is important to think about the water management in long-term perspective rather than short-term fixes in order to avoid undesirable and often irreversible effects on society as well as on the natural environment.

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Appendix A: Questionnaire design

Questionnaire about water in municipalities in Slovakia

This questionnaire is part of a research for master's thesis and results will serve as primary data.

1. How many hours do you spend on water management weekly?
 - a. 1 to 10
 - b. 11 to 20
 - c. 21 to 30
 - d. 31 and more
2. Is the sustainability of drinkable water resources priority in your work?
 - a. Yes
 - b. No
 - c. To certain extent
3. Does water represent an opportunity for economic development in your municipality?
 - a. Yes
 - b. No
4. Do you have any problems with the supply of drinkable water in your municipality?
 - a. Yes
 - b. No
5. If you answered Yes to the previous question, how serious is this problem?
1 2 3 4 5
1= little serious; 5= very serious

Floods:

6. To what do you attribute floods in general?
Choose one option that you think is the most appropriate
 - a. Heavy downpour
 - b. Natural phenomena
 - c. Greenhouse effect
 - d. Political mismanagement
 - e. Other:
7. Has your municipality ever experienced floods?
 - a. Yes
 - b. No
8. Has your municipality taken preventive action against floods?
 - a. Yes
 - b. No
9. Do you agree with this statement; Slovakia's efforts in flood control and prevention are sufficient given the current state of the economy?
 - a. Agree
 - b. Disagree

Landscape Revitalization and Integrated River Basin Management Programme:

10. Have you heard about revitalization program that took place from 2010 until 2012?
 - a. Yes
 - b. No
11. Did your municipality take part in this program?
 - a. Yes

- b. No

12. If yes, in which areas did the program help your municipality?

Check all that apply

- a. Employment
- b. Flood control
- c. Economic development
- d. Environmental
- e. It did not help
- f. Other:

13. Would you be interested in taking part in such a project? Whether your municipality participated before or not.

- a. Yes
- b. No
- c. Maybe

If you have any comments, please write them here:

Appendix B: Interview questions

Water management in the municipality:

1. Could you describe the state of water management in your municipality?
 - a. What problems are you dealing with currently? Are there any ongoing projects?
2. When was the last time, your municipality has experienced flooding?
3. What damages did the flooding cause?
4. Did the municipality or state take any flood preventive actions as a response to the last flood?
5. Do you think a similar situation will occur again?

Revitalization program:

6. Did your municipality take a part in the revitalization program?
7. Were you in the office at the time of the revitalization program?
8. Could you describe your experience with this program?
 - a. What was done/not done?
9. How do you evaluate this program in accordance with the situation in your municipality?
10. In which areas, did the program help the municipality in which it did not?
 - a. Could you tell me some examples?
11. How did you find working with different participants of this program? For example, the companies or the NGO, People and Water.
12. Do you think such projects represent a solution for the current water management situation?
13. In your opinion, what are the main advantages and disadvantages of such projects?

A state of the current water management:

14. What do you think about how the state currently manages water?
 - a. For example, in regards to the most recent debate about the protection of drinkable water in the Constitution.
15. How do you evaluate the current approach of the government towards flood protection and prevention?
16. What do you think about the solutions the government is suggesting and implementing?
17. Do these solutions have any impacts on the situation in your municipality?
18. What would you change about the current water management in Slovakia?

Appendix C: Structure of the SWME

The structure of the Slovak Water Management Enterprise (SWME) consists of hierarchical relationships between the SWME and different regional branches (SVP 2007):

