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The urban river

A conceptual and empirical investigation of the
Code river area in Yogyakarta, Indonesia

Master's thesis in Geography
Supervisor: Ståle Angen Rye
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Abstract

Studies on water and the city allows for exploring the complex relations of nature and society. Building on an account of how the changing understanding of ‘nature’ within the discipline of geography has created a dualistic divide of the field, the aim of the thesis is to explore how the nature-society relations of the city can be understood through the study of the urban river.

This aim is integrated in the thesis through two approaches to the study of the urban river. Through the conceptual approach, urban political ecology (UPE) is engaged with to consider how its theorizations of nature-society relations and the concepts related to water can be used to understand the urban river. Here, the hydrosocial cycle is presented and engaged with through the question: What is the river? The river as a hybrid and socionatural flow, as a material flow, and as a resource is explored as concepts of which enables an understanding of the river as an active agent within the production of the socionatural urban space. Through the engagement with UPE literature on urban water, Integrated Water Resource Management (IWRM), and water governance, the theoretical and empirical possibilities of a situated UPE is explored. The theoretical and empirical possibilities of engaging with UPE of water on the urban river is further expressed through the empirical approach, a document analysis of empirical research on the Code river area in Yogyakarta, Indonesia.

In the document analysis, eight different perspectives on the Code river area within empirical research are categorized and discussed through an employment of the concepts of UPE of water and situated UPE. The riverside dike, spatial planning and architecture, local participation, tourism, the focus on technological and engineering, and the use of the sustainability concept and the term ‘slum’ in the research are all aspects of the Code river area through which the hydrosocial relations of the urban river area are expressed in different ways. This allows for understanding how the Code river and the kampung is connected through the hybrid and material flow of the river, and the value of the river as a resource. This enables an understanding of how the urbanization processes of the urban river area are constituted through complex nature-society relations, with the hydrosocial cycle as an entrypoint. Together, the two approaches to the study of the urban river explore how the nature-society relations of the city can be understood through the employment of UPE of water. The approaches highlight in this way how a geographical condition or entity can be studied as a hybrid, thus contributing to overcome the ontological and epistemological divide within the geographical discipline.

Sammendrag

Studier av vann og by tillater en utforskning av de komplekse relasjonene mellom natur og samfunn. Basert på en gjennomgang av hvordan den skiftende forståelsen av 'natur' innen geografi har skapt et dualistisk skille i faget, har denne oppgaven som mål å utforske hvordan natur-samfunnsrelasjonene i byen kan forstås gjennom en studie av den urbane elva.

Dette målet er integrert i oppgaven gjennom to tilnærminger til studiet av den urbane elva. Gjennom den konseptuelle tilnærmingen blir urban politisk økologi (UPE) brukt for å vurdere hvordan dets teoriseringer om natur-samfunnsrelasjonene i byen og konseptene relatert til det urbane vannet kan bli brukt for å forstå den urbane elva. Her blir den hydrososiale syklusen presentert og brukt gjennom spørsmålet: Hva er elva? Elva som en hybrid og sosionaturell strøm, som en materiell strøm, og som en ressurs blir utforsket som konsepter som muliggjør en forståelse av elva som en aktiv del av produksjonen av det sosionaturelle urbane rommet. Gjennom bruk av litteratur innen UPE på urbant vann, integrert vannressursforvaltning (IWRM), og vannstyring, blir de teoretiske og empiriske mulighetene knyttet til situert UPE utforsket. De teoretiske og empiriske mulighetene ved bruk av konsepter rundt vannets urbane politiske økologi kommer deretter også til syne gjennom den empiriske tilnærmingen, en dokumentanalyse av empirisk forskning gjort på området knyttet til elva Code i Yogyakarta, Indonesia.

I dokumentanalysen blir åtte forskjellige perspektiver innen empirisk forskning på området knyttet til elva Code identifisert og diskutert ved bruk av konsepter knyttet til vannets urbane politiske økologi og situert UPE. Flommur, arealplanlegging og arkitektur, lokal deltakelse, turisme, fokuset på teknologi og ingeniørarbeid, og bruken av bærekraftsbegrepet og termet 'slum' er alle aspekter i området knyttet til Code hvor det urbane elveområdets hydrososiale relasjoner kommer til uttrykk på forskjellige måter. Dette skaper en forståelse av hvordan elva og bosettingene langs bredden er knyttet sammen gjennom den hybride og materielle elvestrømmen, og verdien av elva som en ressurs. Dette tilrettelegger for en forståelse av hvordan urbaniseringsprosessene i elveområdet blir konstituert gjennom komplekse natur-samfunnsrelasjoner, med den hydrososiale syklusen som utgangspunkt. Sammen utforsker de to tilnærmingene til studiet av den urbane elva hvordan natur-samfunnsrelasjoner i byen kan bli forstått gjennom bruken av vannets urbane politiske økologi. Tilnærmingene fremhever på denne måten hvordan et geografisk forhold eller enhet kan bli studert som et hybrid, og bidrar slik til å overkomme det ontologiske og epistemologiske skillet innen geografifaget.

Acknowledgements

First and foremost, I want to thank my supervisor Ståle Angen Rye for the steady, reliant, and motivational council over nearly two years. Your continued belief in me and the thesis through the ups and downs and cancelled visa applications have been invaluable.

I also want to thank Tadzki Nurshafira at CitRes for all the help and support throughout the project. Your contribution with finding research documents and other information on the Code river area and Yogyakarta has been of great importance. I also deeply appreciate our conversations about the project and the Code river, these have been a source of inspiration and motivation.

As this thesis concludes my 7 ½ years of higher education, I also want to say a big thank you to all my fellow students at UIB, PUCE, and NTNU throughout the years. I've been so lucky for having shared the lecture hall and reading rooms with such a great group of talented and awesome people. Additionally, I want to thank all my friends at Studentersamfunnet i Bergen, Studentersamfundet i Trondhjem, in UKA and in SIT, who has showed me that being a student is much more than just studying.

Finally, I want to thank my family. Your unconditional love and support mean the world to me. Thank you for providing me with homemade bread and motivational speeches whenever I needed it.

Trondheim, November 2021

Sigrid Daae Alstad

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Abbreviations

BNPD	<i>Badan Nasional Penanggulangan Bencana</i> (The National Disaster Management Agency)
BPS	<i>Badan Pusat Statistik</i> (The central bureau of Statistics)
CBDRR	Community-based disaster risk reduction
CitRes	Citizen Engagement, Transparency and Transnational Natural Resource Management
DIY	<i>Daerah Istimewa Yogyakarta</i> (Yogyakarta Special Region)
DRV	Disaster resilient villages
FKWA	<i>Forum Komunikasi Winongo Asri</i> (Winongo Communication Forum)
ICWE	International Conference on Water and the Environment
IWRM	Integrated Water Resource Management
KIP	Kampung improvement program
M3K	<i>Munggah, mundur, madup</i> (construct upwards, set back, and face the river)
NGO	Non-governmental organization
OECD	The Organization for Economic Co-operation and Development
PDW	Packaged drinking water

PEU	Political ecology of urbanization
PPLH-UGM	Pusat Penelitian Lingkungan Hidup Universitas Gadjah Mada (Research Centre for Environment of Universitas Gadjah Mada)
RW	<i>Rukun Warga</i> (Community unit)
TEK	Traditional ecological knowledge
UPE	Urban political ecology

1 Introducing the urban river

The whole world is contained within the concepts of nature and society. This is especially reflected in the discipline of geography, where the study of the physical environment, the human society and the relations between these could be said to be central. However, different ideas and understandings of ‘nature’ is also part of what has created a divide between different fields within the discipline (Castree, 2005, p. 10). This is by no means exclusive to geography. The ontological and epistemological separation of nature and society has been prominent in the western philosophical tradition for the last three hundred years (Gold, 1984; Smith, 2006). This dualistic view of society and nature “has long impeded understanding of environmental issues”, as it has effectively excluded the urban in the discussion, according to Heynen, Kaika, and Swyngedouw (2006, p. 3).

However, from its roots within human geography, a more-than-human geography has evolved through extending the focus and including the non-human (Braun, 2005). More-than-human geographies engages with concepts which enables a study of the internal relations of things, of hybrids, and of the urban metabolism of the city as a way of overcoming the dualism (Cresswell, 2013, p. 241). This goes along the line sketched by Heynen et al. (2006, p. 2) of an urban political ecology (UPE), which focus on “the urban as a process of socio-ecological *change*” (emphasis in original). Within this process, material substances like water are part of “metabolic circulatory flows” of urbanization (Swyngedouw, 2006b, p. 22).

Water is a basic necessity of life. Both humans and other beings are dependent on it to live, and it is a dependence that all living creatures have in common. In all its forms, water is an indispensable part of the global environment. The oceans, the rain, the lakes and the rivers are all waterbodies that continuously shape and create the physical landscape.

Water has always had great importance for human settlements (Worster, 1985, pp. 19-20), and had implications for the social development of the human society (Tvedt, 2010). Consequently, water is central in the makings of cities. As Gandy (2002, p. 22) states, “The history of cities can be read as a history of water”. The ways of which water flow through and within the city is an engagement with the complexities of the properties of water, and the social, political and cultural factors (Gandy, 2002, p. 22). This connection is possible to spot when looking back in history, to the old civilizations that developed by utilizing the flowing waters of the rivers.

These civilizations shared the characteristic that they were all situated along great rivers (Macklin & Lewin, 2015). Wittfogel (1957) introduced the term ‘hydraulic state’, and the idea that the oriental state was based on large-scale water management and irrigation. Wittfogel’s theory on the hydraulic state differed from other theories on the origins of governance at the time, and was a perspective which connected the flow of water to larger political structures of society (Service, 1975). The human society and the flow of water in the form of rivers are therefore closely connected through all of human’s history through humans’ dependence of the flow of water (Karr & Chu, 2000).

This perspective demonstrates how understanding water in the city requires an understanding of nature-society relations of which it is constituted. This relation is made apparent through the question Linton (2010) asks through his book *What is water? The History of a modern Abstraction*. His answer comes straight away: “it is what we make of it” (Linton, 2010, p. 3). Water becomes what it is through a process in which society’s ideas and workings with water produces it in a myriad of ways. Through an engagement with how western scientific tradition has resulted in an abstraction of water, where it is being understood as an independent part of the universe which exists independently of humans, Linton (2010, p. 5) makes the case that “water and society [...] make each other, a process by which both water and society are changed”.

This idea is situated within an ontological and epistemological understanding of water as a socionatural entity, produced through processes of metabolism and hybridization (Swyngedouw, 1996; 1999). Through this understanding, Swyngedouw (1996, p. 76) argues that the city can be theorized as “a political-ecological process with water as the entry point”. The understanding of the “physical and bio-chemical processes” of the urban and how the power of these are socially mobilized and produce specific urban environments, is central within urban political ecology (UPE) (Heynen et al., 2006, p. 6). The city, then, is a fruitful ground for studying how water are active within the nature-society relations from a point of view which don’t pre-suppose a separation of nature and society but see it as part of the same.

Water scarcity and water poverty has been central themes within the studies of political ecologies of water (Johnston, 2003; Loftus, 2009). This focus is also reflected in works within *urban* political ecologies of water. Here, urban water infrastructure, water provision, access to water, the degree of privatization of water resources and mostly related to drinking water are major themes, as research by Bakker (2003a, 2003b, 2007), Gandy (2002), Kooy and Walter

(2019), Kooy, Walter, and Prabaharyaka (2018), Loftus (2007, 2009), and Swyngedouw (1999, 2004) show. But while being both a reasonable focus and an important field of study one can't help but notice that what is often not focused upon are the smaller, urban rivers as active socio-natural flows in themselves. It must be noted that in some of the texts referred to above, the river is studied, but in the context of damming for hydropower or water supply, like Bakker (2003b), Loftus (2007) and Swyngedouw (1999).

There should be space for the study of a particular urban river area as an area in which socio-ecological processes occurs as part of the urbanization processes of the city. Some studies within UPE of water are concerned with the river in this way, like Batubara, Kooy, and Zwarteveen (2018), which explores the processes of river management and relates this to uneven development. This opens questions for considering how the river is an active agent within the urban landscape and plays a role in the processes of urbanization. The urban rivers are heavily influenced by the human society through pollution, ecological degradation and modification of river channels (Grimm et al., 2008; Gurnell, Lee, & Souch, 2007), to the point where river rehabilitation after the acknowledgement of the ecological importance of the river has become important (Everard & Moggridge, 2012). Considering how most empirical research on urban rivers are centred on North America and China (Francis, 2012), and the northern bias within the theorizations of UPE (Lawhon, Ernstson, & Silver, 2014), a study of the urban river in the global south have both empirical and conceptual relevance for the discipline of geography and expanding the understanding of the nature-society relations of the city.

Within UPE, water is not only water but is a socio-natural entity, a hybrid flow that is neither natural nor human (Linton, 2010). The river is not just a physical flow of water, it is also everything humans portray and use it as. A vehicle of transportation, a geomorphological force and process, a source of urban green areas, a water source, an energy source, a cultural and religious site. Considering the dualistic understanding of nature and society within geography, then, the study of the urban river through the employment of concepts of UPE of water could be a way to understand the complexity of the nature-society relations of the city, and in so doing explore how this can contribute to overcome the dualistic position of physical and human geography within the geographic discipline.

1.1 Overall aim and research questions

Based on the discussion above, the overall aim of this thesis is to explore how the nature-society relations of the city can be understood through the study of the urban river. Through two related

approaches, the urban river will be approached conceptually through an engagement with UPE of water, and empirically through a document analysis of empirical research on of the Code river area in Yogyakarta, Indonesia. An engagement with the changing understandings of the ideas of nature in the discipline of geography will serve as a background for how the conceptual and empirical approaches are embedded within the ontological and epistemological divide of the geographical discipline.

The conceptual approach is constituted through the following research questions:

1.
 - a) How can an engagement with UPE on the urban river contribute to overcome the dualistic position of physical and human geography within the geographical discipline?
 - b) What theories and concepts of UPE can be applied to understand the urban river?
 - c) What theoretical and empirical possibilities does the engagement with UPE of water provide when studying the urban river?

The empirical approach is constituted by a document analysis of research concerning the Code river area in Yogyakarta, Indonesia, where effort will be done to explore how the conceptual framework developed through the conceptual approach can be used to discuss and understand the nature-society relations of the Code river area. Through a thematic analysis of 23 empirical research texts (see appendix), different perspectives on the Code river area within this research is identified and discussed through an engagement with the concepts of UPE of water.

The empirical approach will through the document analysis and discussion be guided by the following research questions:

2.
 - a) What perspectives are prevalent in the research on the Code river area?
 - b) How can the concepts of UPE of water be used to understand the perspectives within research on the Code river area?
 - c) How can the concepts of UPE of water be used to understand the nature-society relations of the Code river area?

By employing the concepts of UPE of water, the document analysis of research on the Code river area will serve as an empirical ground on which to engage with the conceptual work done in the first part of the thesis. The analysis of the research will allow for a discussion on how the

concepts of UPE can be used to understand the nature-society relations of the Code river area through the conceptual and empirical investigation of the urban river.

1.2 Approaching the urban river conceptually

The positioning of the urban river within a theoretical discussion regarding nature-society relations open for interesting possibilities. As mentioned above, the different ideas and understandings of nature has strongly influenced the discipline of geography and are central to how it has evolved. This is an interesting background which situates the study of the urban river through an engagement with UPE of water within the challenges of the dualism within the discipline of geography.

This thesis, then, rests in large part on a conceptual approach to the study of the urban river through the employment of UPE of water. As UPE is a relatively young theoretical field, recent debates and discussions will be engaged with to explore how the study of the urban river through UPE situates itself within these discussions. The methodological debates led by Angelo and Wachsmuth (2015) and Connolly (2019), and the inclusion of southern theory in the creation of a situated UPE by Lawhon et al. (2014), are central here.

Effort will go into exploring how UPE and its concepts related to water can be used to understand the urban river. By asking the question: What is the river?, concepts of the hydrosocial cycle will be engaged with to understand the urban river as more than just a hydrologic flow of water (Swyngedouw, 2006a), but as a fruitful lens for analysing and understanding the nature-society relations of the urban river area. UPE literature on urban water, water management, and water governance, will be engaged with in the effort to create a framework for engaging with situated UPE on the urban river.

This conceptual engagement with UPE of water will lay the ground for the empirical engagement of the thesis which involves analysing perspectives within empirical research on the Code river area in Yogyakarta, Indonesia.

1.3 Approaching the river empirically: Analysing perspectives within empirical research on the Code river area

Yogyakarta is the capital city of the special region of Yogyakarta (*Daerah Istimewa Yogyakarta (DIY)*) on central Java. Here, in the southern slopes of Mount Merapi, the Code river has its springs. From there, it runs through the city of Yogyakarta and towards the shores of the Indian

sea. Although not a big river, it is nonetheless part of the urban landscape of central Yogyakarta and has played its role in the historical development of the city (Setiawan, 1998).

All through the city centre, the shores of Code are inhabited by people living in areas of settlements called *kampung*. This name reflects a special position in terms of the urbanization of Indonesian cities (Ford, 1993; B. Setiawan, 1998). These settlements' history of living with the river is a long one, and the areas along the river and several different aspects of the area has been subjected to researched, as chapter 8 will show. It is an urban area where the processes of urbanization and the material flows of the river meet and create a unique area where the nature-society relations of the city can be studied. Chapter 7 will further introduce the Code river area as the study site of which the documents analysed in chapter 8 is concerned.

Through an analysis of different perspectives within empirical research on the Code river area, the concepts of UPE of water and situated UPE will be employed to discuss and understand the nature-society relations of the area. Furthermore, UPE literature on urban water, water management and governance, in addition to methodological debates within UPE and situated UPE will provide context for the theoretical and empirical possibilities an engagement with UPE of water on the urban river can provide. The conceptual and empirical approaches are therefore connected through the joint engagement with UPE on the urban river area.

The empirical approach could also be considered as a way of engaging with the environmental and urban imaginaries of the urban river area (Huysen, 2008; Peet & Watts, 2004), thus enabling an engagement with of how the perspectives are produced and contested understandings of a specific locality (Nesbitt & Weiner, 2001). Urban imaginaries have been central within UPE for a long time and is a relevant perspective to have in mind regarding its take on how "the urban" is produced (Gabriel, 2014, p. 40).

It is my belief that a study of the urban river through the engagement with UPE of water, can give important and relevant information regarding the role of water in the society, both for the daily life of the urban residents, and the overarching urban water governance strategies in relation to urban water risks and urban development strategies. Understanding of the complex relations between our society and the world around us, enables us to see the connections between our actions and the consequences. This insight is important, as according to Bai et al. (2018), urban researchers have the opportunity to contribute greatly to science regarding the effects of climate change in cities. The authors present several different research priorities, in

which water is a recurring issue. The river plays a role here, as both the quantity and the quality of water resources will be influenced due to climate change (Perini & Sabbion, 2017).

Keil (2020, p. 2364) puts this into a recurring theme regarding how “cities can save the world”. He argues that there is work to be done on the conceptual and theoretical front in understanding how cities can save the world. The focus of UPE is valuable as “its understanding of life (and survival) in the millenarian climate of climate change will be critical to unlock the potentials of democracy and justice that makes the world worth saving” (Keil, 2020, p. 2366).

1.4 Structure of the thesis

Chapter 2 provides background for the conceptual and empirical approaches of the thesis, as I will explore how different ideas of ‘nature’ has been prevalent throughout the history of geography. The theorizations around nature-society relations will be explored through the engagement with the field of geography, leading into identifying current frameworks and concepts that can be used to understand nature-society relations of the city.

Chapter 3 will present and discuss the overall design of the thesis, as a desktop study consisting of a conceptual approach and an empirical approach. These will be accounted for and discussed.

Chapter 4 will introduce urban political ecology (UPE). The recent developments connected to the different strands within the field will be discussed, and this thesis will position itself within these.

Chapter 5 goes deeper into the field of UPE of water. Here, the hydrosocial cycle will be accounted for, and the concept related to it will be explored through asking the question: What is the urban river?

Chapter 6 will engage with literature within UPE of water regarding urban water governance and water management. Integrated Water Resource Management (IWRM) and water governance will be understood through the lens of UPE. Finally, this research will be coupled with examples of situated UPE of water in the global south to create a foundation for a situated UPE of the urban river.

Chapter 7 will introduce the Code river area in Yogyakarta, Indonesia. The chapter aims to provide empirical contexts of the study site of which the empirical research analysed in chapter 8 is concerned and focus on understanding the *kampung* as an urban settlement.

Chapter 8 will analyse and discuss empirical research on the Code river area in Yogyakarta. Different perspectives within the research are identified and categorised accordingly. The conceptual work done in chapter 4, 5, and 6 will be engaged with to analyse and discuss the different perspectives.

Chapter 9 will gather the threads from the work done through the conceptual and the empirical approach in a concluding discussion related to the research questions, potential areas of future study, and the overall aim.

2 The relation between nature and society in geography

‘Nature’ is a term which on its own have a myriad of meanings, definitions, and understandings connected to it. It is not uncommon to hear that it is some of the more difficult and complex terms to yield in research (Watts, 2005). Nevertheless, being a much-used concept within the discipline of geography, the concept of ‘nature’ and how its relation to the human society is understood, sits at the core of the field (Castree, 2005, 2011). As Castree (2005, p. xix) argue in his book, “analysis of how nature is understood *in* geography is necessarily one about the nature *of* geography” (emphasis in original).

I believe that an engagement with the historical development of the discipline through the changing understanding of nature will provide insight into how geography has developed a disunity regarding its understanding of nature-society relations (Castree, 2011; Herbert & Matthews, 2004). This engagement will both provide background for the upcoming chapters and place the ontological and epistemological discussion of nature-society relations within the context of the continuous development of geography. This chapter is therefore related to research question 1a, in that this focus enables an engagement with central discussions regarding epistemological and ontological challenges within the discipline of geography.

First, I will discuss the concept of ‘nature’ through Castree’s (2005) exploration of its definitions and uses. Then I will make an effort to distillate the changing position and understandings of ‘nature’ in the historical development of geography, building on Castree’s (2005) and Cresswell’s (2013) extensive accounts. Through this, water as a unit of study of nature-society relations will be presented through the later developments of more-than-human geographies.

2.1 A chaotic concept

Beginning with the word ‘nature’, it quickly become clear that when used in daily life, the understanding of it for most people seems quite straightforward. ‘Nature’ is what is non-human and is the physical surroundings that exist independently of humans and our makings. However, going deeper into it, it becomes clear that defining it is a question of ontological and epistemological belief. As Castree (2005, p. xxii) explains in the preface of his book *Nature*; “ideas about nature are as important as the realities they purport to describe and explain”. He

argues that “there is no way to understand nature except through the particular filters and templates that are bequeathed to us by all the knowledge-producing organizations of modern societies”. What nature is, is told to us directly or indirectly, and therefore the question regarding what nature is, becomes a question of what ideas we have about nature (Castree, 2005). What particular ideas or images do we have that represent, or *are* nature? These are, in Castree’s mind, just as “real as the living and inanimate things those ideas represent” (Castree, 2005, p. xxii).

Through a presentation of seven stories that in different ways engages with ‘nature’, Castree present the three meanings of the word ‘nature’. These are “the non-human world”, “the essence of something”, and “an inherent force” (Castree, 2005, p. 8). In the definition of nature as the non-human world, nature is almost a synonym for the environment. This definition resembles the one mentioned above, arguably the most common one. It does not encompass humans, something that the second definition does. Nature as the essence of something is including the humans, and more specifically the physiological and psychological qualities of people. This connects the second definition with the third, that nature is an inherent force which influenced both humans and non-humans.

‘Nature’ has a myriad of meanings, or referents, and it is therefore often called a “chaotic concept” (Castree, 2005, p. 36), which additionally has “collateral concepts (Olwig, 1996, p. 87, cited in Castree, 2005, p. 40). This is something that leads to the elusiveness of the concept, together with the instability of the referents of the word itself, especially when trying to connect it to ‘culture’ (Watts, 2005). Watts points to the fact that although most often seen as opposites, nature and culture are two concepts with a “veritable information highway between them” (Watts, 2005, p. 143). They can, in other words, not be understood separate from the other, but understood in relation with one another. Nature is what culture makes it, and culture is what nature makes it.

Castree (2005, p. 8-9) argue that the understandings and meanings of the word ‘nature’ is limited, and that this specially becomes clear when asking the question: “Where is nature?”. Here, the conventional understandings give us two answers. One is that nature is located outside the urban, in the countryside and in the wilderness. The other sees nature through its “visible types” like the forest, the mountains, the water, the landscape. Both places nature geographically outside of human settlements (Castree, 2005, p. 9). However, through the seven

stories, Castree argues that “Nature is always here – intimately a part of us – not just somewhere else or beyond us” (Castree, 2005, p. 9).

Castree (2005) explore the different understandings of nature through the perspective of geography. His book is about “how *geographers have understood nature*” (Castree, 2005, p. 9, emphasis in original). Ideas about nature and the understandings of it have been central to the discipline of geography from the very start and are both central throughout the history of the discipline, and part of what constitute and differentiates the different part of the field (Castree, 2005, p. 46). Castree (2005, p. 42-43) insists that the nature that geographer’s study, is not the “real world” itself, but an idea and a concept. The next part will follow this line of thought, as it will engage with the historical development of the field seen from the perspective of ‘nature’ – which also will entail an understanding of ‘nature’s relation to ‘society’.

2.2 Understanding nature and society in geography

The separation of geography in the fields of human geography and physical geography comes from the epistemological difference between human geography and physical geography, which is built on the ontological difference between nature and society seen through the different meanings of ‘nature’ (Ginn & Demeritt, 2009). The “society-nature problematic” has according to Castree (2011, p. 287), long been prevalent in the identity of geography.

Consequently, the changes in how nature has been understood by geographers are closely related to the changes of the discipline itself (Castree, 2005, p. 46). In this section, I will use this insight to trace the ways ‘nature’ has been understood throughout the history of the discipline, and in so doing establish the aim of this thesis within the ontological and epistemological challenges of geography.

2.2.1 Early geography: a world discipline

While Castree (2005, 2011) righteously goes back to the beginnings of geography as an academic discipline in the nineteenth century, geography has roots to the ancient Greek with writers like Herodotus and Eratosthenes (Cresswell, 2013). Cresswell notes how the difference between these geographers is starkly similar to the differences between physical and human geography today (Cresswell, 2013, pp. 17-19). He also notes how geographic theory has been around for over 1,500 years and argues that the ancient and in some cases rediscovered knowledges in the fifteenth and sixteenth centuries, paved the way for geography to become an academic discipline by the late nineteenth century (Cresswell, 2013, pp. 28, 32).

Castree (2005, p. 49; 2011, p. 288) refers to Halford Mackinder's speech to the London's Royal Geographical Society in 1887 when placing the study of the relations between nature and society in the very beginning of geography as an academic discipline. Mackinder argued that geography could "bridge one of the greatest of all gaps", the one separating "the natural sciences and the study of humanity" (Mackinder, 1887, pp., 145, cited in Castree, 2011, p. 288). Geography was then in its early days defined by the intention of studying nature-society relations as a reaction to academic specialization (Castree, 2005, p. 10).

This led to an early development of the discipline into as a "world discipline", where the relation between nature and society stood at its centre, and with a wide scope and subject matter (Castree, 2011, p. 288). This focus on the relation between "natural and human worlds", as Cresswell (2013, p. 47) puts it, and the influence of evolutionary theory, resulted in what is called environmental determinism (Castree, 2005, p. 54). This explanation on how the natural condition causes and explains the human world was dominant in the early years of the discipline, which resulted in what Peet (1985, p. 309) calls a "quasi-scientific form of racism". However, Cresswell (2013, p. 55) argue that despite the rejection of its "simplistic science and racist undertones", it nevertheless played an important part in the introduction of the ideas of 'nature' and 'the natural'. Some of the controversy of the ideas of environmental determinism, Cresswell (2013, p. 56) connects to the various meanings of the word 'nature' as an inherent force or the essence of something, as discussed in the previous section.

Castree (2005, p. 57) reflects on the question of nature for the early geographers and note that despite the centrality of nature in their work, "nature was also a double-edged sword". This entails that they used nature to distinguish their perspective on the world in a holistic and integrative way, while also being its main intellectual weakness. The wish to understand the world and its environments at a grand scale, and the leaning towards description and speculation over "well-justified explanation" created problems that despite the growth and establishment of geography as a discipline in the western world, led to consequences for the development of the discipline into the twentieth century (Castree, 2005, pp. 57-58).

2.2.2 Nature in geography as spatial science and representations

Castree (2011) identify the post-war period as a turning-point for geographic research on nature-society relations, as the field shifted towards the virtues of rationality, measurement, and precision in geographical research. The quantitative revolution and the focus on modelling reflected the urge to establish geography as a scientific discipline, and spatial geography was developed (Cresswell, 2013; Holt-Jensen, 2007, pp. 83-84).

As a result of the quantitative revolution post WW2, efforts were done to make geography into a spatial science (Cresswell, 2013, p. 81; Castree, 2005, p. 66). Where regional geography had been occupied with studying the particular and unique of a region, the spatial geographers of the 1950s and 60s wanted to focus on developing generalizable theories and claims using quantitative methods and mathematics (Cresswell, 2013, p. 81). Although this development of geography was to become heavily criticized in the following decades, it nonetheless laid the foundations for physical geography to develop. Geomorphology became “more specialised, more rigorous, less descriptive approach to the physical environment than almost anything found pre-1939 geography” (Castree, 2005, p. 68). Nature in spatial geography, then, I think, became abstract, as the methods made nature into parameters in quantitative models.

As physical geography during the quantitative revolution became even more centred on the ‘natural’, physical world, then, a similar thing could be seen happening with human geography with its focus on the ‘human’ world. Because by the 1980s, these two parts of the discipline were “relative strangers” (Castree, 2005, p. 86). They were divided by subject matter and styles of analysis, and as feminism, Marxist theory, and structuration theory gained ground, a “critical human geography” developed (Castree, 2005, p. 88). Castree (2005, p. 89) notes that by the late 80s human geography was closer to social science and sociology than to issues of environment and nature.

However, writers of human geography did engage with nature in some way. As Castree (2005, p. 89) puts it, “nature was rediscovered” in a “de-naturalizing way”. The focus on representations of nature and how social relations transformed nature was central here. This work was informed by post-modernism, post-structuralism and post-colonialism, which had gained ground in cultural studies (Castree, 2005, p. 92). Human geographies included nature in their work, but in ways which de-naturalized or de-mystified the notion of the pristine and unchangeable nature (Castree, 2005, p. 91).

As mentioned above, Marxist theory was part of this development of human geography. Historical materialism had, with the writings of David Harvey and Neil Smith, become a line of thinking that will be seen to play a role in the more recent development of parts of geography that sees nature and human society as not separate fields of research.

2.2.3 Historical materialism and production of nature

Cresswell (2013, p. 124) presents context of the emergence of Marxist geography in a time of change, as a field which wanted geography to make a difference in a changing world. Marxist

theory differs from other theoretical thoughts by making “no attempt at being politically neutral or objective” (Cresswell, 2013, p. 125). The separation of fact and value in traditional theory was seen as the key problem by Marxist theorists like David Harvey (1973) and Richard Peet (1978), Cresswell (2013) notes. Harvey (1984) pointed to this fact by employing the idea of production of constructed geographical knowledge in relation to class interests, which made geographical knowledge ideological. This required a theoretical revolution, where academics use their knowledge not to confirm theories or conditions we already know, but to make theories and inquiries about the reality that challenge the status quo (Cresswell, 2013, p. 126; Harvey, 1973, 1984).

Before presenting historical materialism, relational dialectics must be accounted for. Historical materialism was according to Linton (2010, p. 25) based on Hegel’s idea of historical change through a “dialogue of ideas”. This dialogue is dialectical, meaning a “dynamic process by which ideas arise and are confronted – or contradicted – by opposing ideas” (Linton, 2010, p. 25). This does again lead into new ideas, new opposing ideas, and so on. Marx turned this process on its head and argued how the material conditions plays a role as “the major determinants of the (temporal) sequence of historical events” (Linton, 2010, p. 25).

This development is central in historical materialism, which consists of three parts that each makes up a whole (Cresswell, 2013, p. 127). Cresswell explains that the first is the idea of how society go through a series of stages from feudalism, via capitalism, to communism. The second is the base and superstructure-model. This model explains how the superstructure, which could be understood broadly as the ‘culture’ of a society, is determined by a certain economic system. Finally, it’s the idea that the mechanisms that lead to the historical changes of society are determined by the changing modes of production. This are used to explain how eventually, communism will follow capitalism (Cresswell, 2013, pp. 127-128).

What is quite clear, is that Marxist theory don’t include much theorization about nature itself (Cresswell, 2013, p. 132). Castree (2005, p. 81) argue that Marxist theory, along with behavioural and humanistic geography, removed nature from human geography during the 1970s. Nature was seen as something beyond the human, it is just there, although being “progressively more contaminated by society” (Cresswell, 2013, p. 132, Swyngedouw, 1999). It is therefore interesting to explore the idea of production of nature, and how this is so central in Marxist theory and the historical materialism.

The idea of production of nature is that production is seen and understood as the transformation of nature into labour. Consequently, the means of subsistence are produced by transforming nature into materials that satisfied humans needs (Peet & Hartwick, 2015, p. 167). The relation between humans and nature could therefore be seen through the labour process (Watts, 2005). This relation between nature and humans through the labour process is closely connected with the concept of ‘metabolism’. As Swyngedouw (2004, p. 15) puts it: “For Marx, this socio-natural metabolism is the foundation of and possibility for history, a socio-environmental history through which the nature of humans and non-humans alike is transformed”.

Cresswell (2013, p. 132) observe how despite not theorizing about nature itself, nature is “at the heart of Marxist thought”. It is the transformation of nature in more “optimal” ways that leads to consistently changing forms of productive relations (like feudalism, capitalism et cetera) that are a central mechanism in historical change (Cresswell, 2013, p. 132).

By seeing the nature as produced, one could also “explore how such productions also serve ideological ends” (Watts, 2005, p. 161). This opens to explore how nature is produced within a capitalist system, leading – according to Neil Smith (1984) – to the theories of uneven development and what Castree (2005, p. 82) calls “Third World political ecology”. In Neil Smith’s book *Uneven Development* in 1984, the idea of production of nature is central. Through the process of the production of nature, what Smith (1984, p. 65) calls “‘second nature’ is produced out of ‘first nature’”. Seen this way, nature is a result of “capitalist processes of labour and capital (Cresswell, 2013, p. 133; Smith, 1984).

These thoughts and ideas paved the way for questioning the relationship between the processes of production in the society and exploring how this influences the physical environment in which humans reside. Blaikie and Brookfield (1987) wrote about how soil erosion was “a result of the organization of society”, using the inspiration from Marxist thought to shed a light on “power relations and large-scale societal structures”, which was a communality for Marxist geographers (Castree, 2005, p. 83). This work was central in the development of political ecology, and later urban political ecology (UPE) (Zimmer, 2010).

So far in this section of the chapter I have gone through the history of the discipline of geography through the changing understandings of ‘nature’. Different ideas and perspectives of nature has been central through its development. What geography have in common is the engagement with some sort of nature, whether it be the physical landscapes, the physical surroundings of humans and how they interact with that, ‘human nature’, or as a means of

production. This have resulted in different strands that understand 'nature' differently, which according to Castree (2005, p. 224) has led to an ontological divide that many seem contempt with.

However, as Castree (2005, p. 224) points out, there is work that "seek to overcome this chism". This has developed into Cresswell (2013) calls more-than-human geographies, which in many ways engages with relational thinking, as Castree (2005, p. 224) names it as. In the next section, I will explore this work and investigate what possibilities of research this creates.

2.2.4 More-than-human geographies and relational thinking

In contrast to what recent decades of experiences with geography as a discipline divided between physical and human geography, the development discussed above has also shown that this hasn't been the situation through all of its history. For example, as Cresswell (2013, p. 240) notes, spatial geographers also included human processes in their research, but as the critique by humanistic and Marxist geographers increased, the divide grew as "the theoretical dimensions of human geography became more abstract and sophisticated".

Where in the field of geography today, then, is it possible to see a bridging of physical and human geography? Cresswell (2013, pp. 241-246) uses the work of urban studies, and more specifically studies of "the role of nature in the city" as an example of this. Doreen Massey's (1999) work on time and space in geography, and how space should be included more in research in human geography are central here. Jonathan Phillips (2004) argued for an increased interrelatedness between human and physical geography for new theory development. He saw the future of physical geography coming into a theoretical stagnation if not including human agency in the research (Phillips, 2004). On the human geography-side Braun (2005) argued for an inclusion of physical properties of water in the human geographical study of the political economy of water, not very different from how Karen Bakker (2003b) is argued for the understanding the role of water's properties in the process of its commodification. Political ecology is here mentioned as a field which has come the furthest in developing a "productive relationship between aspects of human and physical geography" (Cresswell, 2013, p. 246).

More-than-human geographies does in many ways join these arguments into a line of thinking which involves, as the name implies, expanding the focus of human geography beyond the social, and also including the 'non-human' (Braun, 2005). Urban geography is a field which in large degree has adopted this idea, in its attempt to "challenge the view of cities as the antithesis

to nature”, by understanding it through metabolic relationships, how nature is part of the urban life, and the effects of politics beyond the humans in the city (Braun, 2005, p. 635).

The ontological and epistemological foundation of these perspectives can be connected to what Castree (2005, p. 228) calls relational thinkers. They ask questions like: What if one can think of something as not purely ‘natural’ or ‘social’? What if we can try to think of something as a combination, or in connection, or as a hybrid? What perspective on the world would that give us, and could it be useful in research? These focus their work within actor-network theory (ANT), hybrid geographies, as well as non-representational theory, dialectics, and new ecology (Castree, 2005; Cresswell, 2013). The common denominator for these researchers is that they don’t accept the understanding of nature and culture as something separated but insist on the need to see the world as a common network and focus on understanding phenomena by how they are related through internal relationships with other phenomena (Castree, 2005, p. 224).

Non-representational theory was developed in the 1990s by Nigel Thrift. Castree (2005, pp. 229-230) explains how Thrift (1996, 2004) was concerned with human geographers’ preoccupations with representation of nature. He focused on how we inhabit a material world, and that nature is therefore known through practice, not by studying representations of nature. Humans are practitioners, not observers of the world around. We inhabit the world, and we are and do what we do because of how the material world affect us and we affect the world (Castree, 2005, p. 230; Thrift, 1996). The world is therefore not made up by human and non-human entities, but rather “a set of mutually constitutive encounters or performances” (Castree, 2005, p. 230).

Another perspective is actor-network theory (ANT). Associated with Bruno Latour (1993), it is a field which does its job of overcoming the dualism by using the perspective of the network to explain how things and people are related and connected through networks. Both things and people are actants in a messy world of networks, in which the relations between people and things make up the society (Cresswell, 2013, p. 251; Latour, 1993).

Both non-representational theory and ANT has its connections to what Linton (2010, p. 25) calls “dialectical thinking”. This is related to Hegel and historical materialism, as presented earlier. As Linton (2010, p. 25) puts it, “dialectics sees the world as fundamentally constituted of process, relation, and change”. It is therefore connected with understandings flows of history and of water, and the connection between these (Linton, 2010, p. 25). Its origin and development connected to historical materialism makes power a central piece of this work, in

addition to the focus on relational dialectics (Linton, 2010, pp. 26-27). This is particularly relevant when studying water, Linton (2010, p. 27) argues, as “a relational approach holds that things become what they are in relation to other things that emerge through an overall process of mutual becoming”. The human-nature dialectic is thus central in studies of water and society, Linton shows.

However, this perspective also has its weaknesses. As Harvey (1996, p. 7) points out: “the problem of Historical-geographical materialism”, is namely that “the reduction of everything to fluxes and flows [...] has its limits”. The reference to the use of ‘permanences’, as first developed by Whitehead (1953, p. 137, cited in Harvey, 1996, p. 50) as “practically indestructible objects” (Harvey, 1996, p. 50), is to emphasise the importance of the concrete and permanent in the world. Harvey (1996) looks at this to anchor the relational-dialectical view of historical materialism in the materialities of the world, and thus avoid the weaknesses of the relational view.

Also worth noting, is that even though dialectics are connected to the process of two things, dialectical thinking solves this by focusing on how the binaries are connected through their internal relations (Linton, 2010, p. 28). The idea of internal relations is central to relational dialectics, as it builds on the idea that change happen *among* things, not *to* things (Linton, 2010, p. 29). As Whitehead (1960, p. 92) puts it “Every actual entity is what it is, and is with its infinite status in the universe, determined by its internal relations to other actual entities”.

Lastly, Castree (2005) presents new ecology as the fourth representative of relational thinking. He gives credit to Zimmerer (1994) in the development of the new line of thinking, which opposes itself to ‘old ecology’. Old ecology based itself on the ideas of a stable equilibrium in nature, and the workings of humans were seen as “disruptive forces which failed to respect the integrity of those ecosystems” (Castree, 2005, p. 235). New ecology on the other hand, focused on viewing humans as a part of complex ecosystems. Together with ANT, this new ecology enabled a “talk about ‘nature-society hybrids’ rather than two interacting domains or spheres” (Castree, 2005, p. 235, emphasis in original). Here, we also see the connection with the focus in internal relations in a human-nature dialectical relationship.

If we take a look back at the first section of this chapter, three meanings of ‘nature’ was presented by Castree (2005). All the approaches discussed above are challenging these meanings. They strive to overcome the divide between nature and society, and therefore don’t view something as non-human or human (Castree, 2005, p. 224). Additionally, they are what

Castree (2005, p. 236) calls “non-essentialist”, implying that instead of thinking that something has an essential natural core, it is dependent on the context and its internal relations to the world around it. This theoretical project takes on a big challenge of restructuring the academic division of labour in the geographic departments, and to take it on their word, it implies not being able to study ‘human’ or ‘nature’ issues independently (Castree, 2005, p. 241). As Castree (2005, p. 241) notes, a kind of environmental geography would have to dominate the whole field. However, I would still argue that the relational way of viewing the world and its inhabitants could serve some purpose for seeing and understanding the interrelated connections between the human world and the physical environment. As mentioned by Linton (2010, p. 27) studies on water is fields where the ideas of a more-than-human geography and a relational approach could be beneficial. This makes these theoretical fields relevant when it comes to understanding the urban river. The next section will go deeper into why water is relevant to study in this regard, and particularly how this perspective can help us understanding the relation between the river and the city.

2.3 Studies of water: an entry into the socionatural city

Water has already been mentioned in this section as an area of study where ideas of the relational more-than-human geographies could be applied. As Linton (2010, p. xvii) puts it, “The state of water always reflects, in one way or another, the state of society”. He goes then on to point to the fact that, despite of this, modern society has accomplished to “construct an idea of water as something apart from the broader contexts in which it occurs” (Linton, 2010, pp. xvii-xviii). I would say that there is a theoretical and empirical potential in studying water theoretically and empirically in relation to the city.

Braun (2005) writes about how urban geography up for a long time lacked the inclusion of the natural and for a long time saw the city as the opposite of nature. This is something that can be traced a long way back, considering the development of geography presented in this chapter. However, as political ecology gained ground, UPE also presented itself as a field in which the issue of water “looms large” in the literature (Braun, 2005, p. 644). As Loftus (2012, p. xxi) argues, urban environments “are best seen as assemblages of social and natural relationships”. UPE can therefore give insights into how urban environments are produced in a historically and geographically specific ways (Loftus, 2012).

As Braun (2005) and Bakker (2003b) both focus on, the physical properties of water must and should be included in urban studies. As Braun (2005, p. 645) puts it, “while there has been great

talk about the importance of nature in understanding the city, and urbanization processes, it is often unclear what nonhuman nature adds to these accounts [...]” (emphasis in original). Bakker (2009, p. 515) also argue that the strict dualism between nature and society (or “physical/human”, as she puts it, is hard to obtain when studying water due to its “mutual constitution of the ‘social’ and ‘natural’ aspects of water” (emphasis in original). In other words, water joins the human world in numerous ways, and it could therefore be used to study nature-society relations, as part of the “production process of socionature” (Swyngedouw, 1996, p. 70).

The concept of socionature, Linton (2010, p. 35) explains, is the result of a theoretical reconstruction of relational dialectics due to its limitation in accounting for the physical properties of H₂O, as expressed by Harvey (1996, p. 50) through the concept of “permanences” (Whitehead, 1953, p. 137). How to consider the materiality of the physical world in dialectical thinking? The result is the concept of socionature, which Swyngedouw (1996, p. 70) defines as a

“historical-geographical process of perpetual metabolism in which “social” and “natural” processes combine in an historical-geographical “production process of socio-nature” whose outcome (historical nature) embodies chemical, physical, social, economic, political and cultural processes in highly contradictory but inseparable manners” (emphasis in original).

This reconstruction of relational-dialectical thinking resulted in a shift from a focusing on purely social construction of nature, to a “consideration of all social processes as necessarily involving non-human nature” (Linton, 2010, p. 35). The inclusion of the “practical indestructible objects” (Whitehead, 1953, p. 137) in dialectical thinking is important, and as Harvey (1996, p. 50) notes, it “forces us always to ask the question of every “thing” or “event” that we encounter: by what process was it constituted and how is it sustained?” (Emphasis in original).

By employing these concepts of the socionatural, then, I would argue that the urban river can be used to further develop the understanding of city as more-than-human (Franklin, 2017). In this perspective, the urban river is an interesting case, as a material waterbody which distinguishes itself from the water in the piped networks. This opens for an inquiry into how the socionatural perspective of hybrid waters could deepen the understanding of the river and its role within the city, as an integrative part of the socionatural and hybrid city (Swyngedouw,

1996). This perspective has gained ground in the literature of UPE who has taken studies of urban water one step further in an UPE of water (Loftus, 2009). Here, the concept of the hydrosocial cycle and hybrid waters has developed, as research on the “socio-ecological nature of water” has gained ground (Linton, 2010, p. 67). This research joins concepts such as hydrosocial metabolism, circulation, and hybridized waters (Linton, 2010, p. 68). These concepts will be discussed further in following chapters.

2.4 Summary

This chapter has explored how different understandings of ‘nature’ in geography has changed and developed the discipline. From aspiring to be an ‘world discipline’, to establish the discipline as ‘hard science’ by the engagement with models, quantitative methods and generalizable theories, to the development of a denaturalized human geography – the issue of ‘nature’ in relation to human society has continued to be at the centre of its development. This engagement can be seen as a creation of a background of which the aim of the thesis is embedded, and in so doing it lays the foundations for the conceptual and empirical engagements of the thesis, as research question 1a is an expression of.

More-than-human geography have been identified as a field where relational thinking can lead to a greater unity of the discipline and see the potential of perspectives that don’t separate into ‘social’ and ‘natural’ boxes (Castree, 2005; Cresswell, 2013). Here, studies of water and in particular water in the city, has been developed as an UPE of water that could be used for understanding how also the river is not only nature that happen to be in the city, but part of the production process of socionature (Swyngedouw, 1996).

These are central concepts for the upcoming chapters and show how the conceptual and empirical approach of the thesis is embedded within the changing understandings of ‘nature’ and its influence on geography. Before UPE of water and its concepts will be further discussed and engaged with, the thesis as a conceptual and empirical desktop study will be accounted for and discussed in the next chapter.

3 A conceptual and empirical desktop study of the urban river

This thesis is a desktop study built on two approaches: A conceptual approach and an empirical approach. Both are approaches of which the overall aim is engaged with. The conceptual approach mainly the conceptual engagements with UPE of water, while the empirical approach is a document analysis of empirical research on the Code river area. My engagement with these approaches in combination is the result of the continuous development of the project since January 2020 and changes due to implications of the COVID-19 pandemic on the original project.

First, the project as a desktop study will be accounted for and discussed. Then the conceptual approach will be presented, where I will engage in a conversation regarding the role of the theory in the context of the methodological debates of UPE, and account for the process of finding the aims and objectives of the study through the development of the project. Second, the empirical approach of the document analysis will be accounted for and discussed, before the I will end the chapter with a critical reflection upon the project from the perspective of cross-cultural research.

3.1 Desktop study as an approach to studying the urban river

The term ‘desktop study’ describes how I have worked on this project from the start. Without having the option to do fieldwork as planned, this was an opportunity to continue with the theme of the original project through a different methodological approach. This involved working both conceptually and empirically at the desk, and in so doing engaging with both theoretical literature, and secondary data in form of academic texts on the Code river area.

The exact wording of ‘desktop study’ varies. Desk study, desk research, and desk-based research are just some of the wordings on this approach, as Rupert Wegerif, a professor of Education at Cambridge, explains. He uses the term ‘desk-based research’ and connects it to what he calls “conceptual research” (Wegerif, 2020, 7th paragraph). He argues that “Developing, questioning and refining concepts in the light of reason and evidence is what the long-term cultural dialogue of science is all about” (Wegerif, 2020, 7th paragraph). Conceptual dissertations have, in this regard, a benefit of being able to explore the greater perspectives and patterns than narrowly focused empirical studies (Wegerif, 2020, 6th paragraph). Taking this

into account, the understanding of my project as a desktop study put emphasis on the theoretical and conceptual benefits of this approach, while also contributing in terms of the empirical focus. The term ‘desktop study’ does in my view emphasise the relation to the empirical field, in ways that both highlight the benefits and creates awareness for its limitations.

The geographic discipline has long traditions with empirical field research, and therefore, doing a purely desktop study is not widespread within the field. For example, in introductory books like “Key methods in geography” (Clifford, French, & Valentine, 2010), the term ‘desktop study’ or variants of it is not mentioned at all. The closest one comes to this kind of research and methods are studies using secondary data, textual analysis, and historical and archival research. Nevertheless, considering the theoretical and conceptual aims of the thesis, I believe that the thesis will benefit from the conceptual focus, considering the arguments of Wegerif (2020) above.

The next section will present and discuss the conceptual approach, which is connected to the overall development of the project as a desktop study.

3.2 Conceptual approach

The conceptual approach consists of the development of a conceptual and theoretical framework which allows the understanding of nature-society relations through the study of the urban river. It is connected to the project as a desktop study through its role in the development of the thesis from the beginning in addition to being a conceptual framework and toolbox for the empirical approach.

3.2.1 The role of theory in the desktop study

Due to changes to the initial project plan, and the decision to continue with the initial research theme of urban water, theory became both the methodological and the analytical starting point of the thesis. While there was still hope of being able to do an empirical fieldwork, I focused on developing a comprehensive theoretical framework, which in addition to introducing me to the field, also served as a guiding line for the continuation of the project through the uncertain times. This process could be identified as the type of literature review that Yin (2011, p. 62) identifies as a selective literary review. Here, the researcher reviews existing literature in the field to gain a more detailed knowledge about studies that highly resemble the study the researcher is planning on doing. The way my use of this method differ, is that rather than reviewing solely other empirical studies concerned the same theme, I reviewed the theoretical concepts of nature-society relations and worked my way through the theory until I ‘found’ UPE

of water as theoretical field with potential considering my initial research aims. By doing this, I figured out what the theoretical orientation of my field of study would be. This was important work that served as a guiding line through the process.

By going from broader theory of the discussion and understanding of the concepts of nature and society in geography, towards the empirical field and how these concepts come to the surface in an urban environment in Yogyakarta, I go from the abstract to the concrete in studying the relations between the river and the city. It could therefore be argued that I've had a deductive approach in both the initial stages, and the construction of the conceptual approach. However, as Helen Simons (2009, p. 33) explains, there are both positive and negative sides of developing a theoretical framework that guide the collection of empirical data and its analysis. In her words,

“Having a theoretical framework at the beginning provides security, focus, and makes analysis comparatively straightforward; the danger is that it can lead to a false consensus – making the data fit the framework – or failing to see the unexpected”.

These are important points to keep in mind, both during the construction of the theoretical framework, and during the analysis of academic texts on the Code river area. Thinking of the theoretical framework as a guiding line that provides the theoretical basis for developing the research question but keeping it at arm's length and with a critical focus when analysing the empirical research, has been important throughout the process. Furthermore, the awareness of this is important to be aware of any theoretical biases during the process. This is also relevant when it comes to using UPE as a central conceptual framework.

3.2.2 Urban political ecology as a conceptual framework

Urban political ecology (UPE) is a central theoretical framework that this thesis is engaging with, as chapter 4, 5 and 6 demonstrates. Through these chapters, I engage with UPE to explore UPE of water as a conceptual framework for understanding the urban river. Building from political ecology to the inclusion of the urban, current debates and trends are identified.

As the methodology of UPE are part of some of the recent debates in UPE literature, an engagement with this debate here and the positioning of my research within it is beneficial to identify some conceptual benefits of the conceptual work in the desktop study as Wegerif (2020) is talking about. Zimmer (2010, pp. 349-350) presents some epistemological and methodological challenges of UPE. She argues that UPE “should be more explicit on the epistemological underpinnings of its analyses” (Zimmer, 2010, p. 350), as the combination of

constructivist and Latourian analyses and the inclusion of hybrids needs a critical discussion. The debate between the methodological city-ism as fronted by Angelo and Wachsmuth (2015), and the ‘socionatural moment’ pertaining from, amongst others, Swyngedouw (1996), can be an example of a debate regarding both the current and future development of UPE literature.

An example of situating the methodology in the debates of UPE is how Batubara et al. (2018, p. 1189) uses “flood infrastructure as methodological device to identify and tease out the broader socionatural transformations characterising processes of urbanization in Indonesia”. They lean towards the “Lefebvarian moment” as argued by Angelo and Wachsmuth (2015), to show how an engagement with urban flood infrastructures also goes beyond the city boundaries and are thus a response to the critique of ‘methodological city-ism’ (Batubara et al., 2018, p. 1192).

Where does my research situate itself methodologically within UPE and the methodological debate? As chapter 4 will go deeper into, I see situated UPE as a field in which could provide positive implications for the project, also in terms of methodology. This could be seen as a response to a challenge of UPE to study cities of the global south, and to study the “plurality of Urban Political Ecologies” amongst different actors with different power relations within a city (Zimmer, 2010, pp. 350-351), in addition to exploring different urban imaginaries connected to the urban river (Gabriel, 2014). Based on this, I therefore see value in that the theoretical engagement of this thesis is connected to the methodological debate in UPE through the engagement with the different discourses within the field.

A thorough engagement with the concepts of UPE of water is therefore the aim of chapter 5. This is connected to the empirical approach of the thesis through its engagement with understanding the urban river through these concepts. Finally, the last part of the conceptual approach is chapter 6, which engages with UPE literature on urban water, and especially urban water management. This chapter, then, works conceptually as it engages with situated UPE to create a situated UPE of the urban river.

Together with the background of nature-society relations from the perspective of geography of chapter 2, these chapters together constitute the conceptual approach of the thesis. As UPE offers conceptual tools to understand and study nature-society relations, I think it is interesting to see how this could benefit the field of geography in terms of broadening the scope for studying the world through nature-society relations and the understanding of these.

3.2.3 Developing the research aim and questions: finding the empirical approach

The overall aim and research questions has been continuously developed throughout the research process, as the engagement with theory, concepts and the empirical field has been evolving in a continuous and ever-changing process, not so different from the one described by Wadel (1991, p. 130). Though this is quite common when employing qualitative methods, I found it a great weakness in the start that I did not have a clear research question. It felt as though it was limiting my ability to find my focus within the theoretical field, and I was therefore worried whether the work I was doing at any point in time actually was relevant for the project.

As I worked with the construction of the conceptual framework, I reached out to a contact through the CitRes research group (Citizen Engagement, transparency and transnational natural resource governance, (CitRes, n.d.)) at the PolGov faculty at Gadjah Mada University in Yogyakarta. While it was clear that I wanted to study urban water from the perspective of nature-society relations, I needed to find an empirical site which I could connect to the conceptual approach I was developing. Through a Zoom-meeting, me and this contact person, which has long worked as a project manager at CitRes and that I knew from the original project, discussed various approaches to studying urban water in Yogyakarta, and soon focused our attention on the Code river. Thus started the engagement with the academic texts on the Code river area, of which forms the empirical approach of the project.

3.3 Empirical approach: Analysing academic texts

This section will present and discuss the empirical approach of the thesis. As discussed above, this approach must be seen in connection to the conceptual approach, as it was developed in tandem, getting inspiration from each other. However, it is important to clarify that where the conceptual approach forms the theoretical background and framework, the empirical approach deals with the academic texts related to the physical location of which these are concerned. First, the perspective of doing ‘remote’ fieldwork will be discussed as a perspective on how to understand the analysis of academic texts as an empirical project. Then, parts of literature review as a method of finding and analysing secondary data related to the case will be discussed, before the practicalities of collecting the data, the characteristics of the texts and the process of analysis will be accounted for and discussed.

3.3.1 Doing ‘remote fieldwork’ in texts

Knapp (2014, p. 13) asks the question “When does the ‘fieldwork’ begin?” (Emphasis in original), and even though her question is directed towards the ‘field’ of academia back home

versus the one ‘out there’, it makes sense to ask the same thing in this situation. As the project started as a planned extensive fieldwork, maintaining the idea of doing fieldwork within the desktop approach contributed to keeping the theme and the theoretical discussions related to the field in a way that has helped in understanding the connection between theory and study site. Looking at the process as doing fieldwork in the research literature and the other sources of context like newspaper articles, Storymaps, Youtube videos and google maps has provided a way of engaging with the field without being there physically. This does not, however, weigh up for being there physically, and just as the literature is secondary data, already produced and presented by someone else – is the other visual media a representation of a reality interpreted by someone else.

The documents themselves have also been a field in which I have done fieldwork. By not only looking at the contents of the texts, but also the form, style, author, language of them has been central in gaining a sufficient understanding of the text, but also as a study site. This resonates with how Asdal and Reinertsen (2020) presents the idea of thinking about document analysis as a way of doing fieldwork. Three types of fieldwork within document analysis can be distinguished, and the third, doing fieldwork in documents, are interesting in this case. Here, you go deep into the documents not only as a source of something else, but as central in themselves. Instead of just recapturing what the documents say, this method concerns itself with understanding the different takes on things and phenomena (Asdal & Reinertsen, 2020, pp. 171-172). This has been highly valuable in this case, as the analysis of the texts as the empirical data is central in studying the different perspectives within the academic texts.

This strategy has been especially important regarding the exploration of the physical, social and political context of the Code river area. Exploring newspapers, StoryMaps, GoogleMaps, youtube videos and blogs were central in building knowledge of the context of the case, in addition to reading lexica articles and research articles. This approach, however, is in danger of producing publication bias (Song et al., 2010). By only choosing sources in English, I effectively exclude all sources in Bahasa Indonesia and Javanese. As webpages in Indonesian in some cases was translated by using the page translator extension in Google Chrome browser, this only takes me so far. It is probable then, that the empirical approach of a desktop study in foreign documents has led to limitation both in terms of understanding and analysis, especially related to correct translation and the nuances of the language within documents. Therefore, although understanding the project as a ‘remote fieldwork’ provides a foundation on which to

understand my position in the ‘field’, it also engages with several biases related to knowledge production, analysis, and discussion.

3.3.2 Document analysis as principal empirical research method

The empirical work in this thesis is concerned with analysing academic texts on the Code river area in Yogyakarta, Indonesia. The texts analysed are research texts of different academic levels which have in common that they are concerned with the Code river area as the study site. The reading, synthesis, and analysis of these data I therefore regard as the empirical work of this thesis. This approach has, as I see it, elements both from literature review and document analysis. Document analysis is, according to Bowen (2009) “a systematic procedure for reviewing and evaluating documents”. Through content analysis, data from the documents are synthesised and organized by themes or categories (Bowen, 2009; Labuschagne, 2003).

The role of reviewing and analysing documents in qualitative geographical research vary. Monk and Bedford (2016) presents literature review as an initial method for gaining information regarding the existing literature in your field of research, and as a key component of the research proposal. Yin (2018, p. 113) presents collecting and examining different types of documents as one data collection method, while Booth, Sutton, and Papaioannou (2016) provide a comprehensive account on how to do a systematic literature review, although with a focus outside of geographical research. In other words, there are many aspects to analysing documents, both as a systematic review and as part of the data collection or the theoretical preparation.

Where my project differ, in this regard, is that I conduct a document analysis as the primary empirical method. As I’ve had no opportunity to produce primary empirical data through an empirical fieldwork, document analysis became the primary method for producing data related to the empirical field. As document analysis can be used to analyse a wide variety of documents (Bowen, 2009), some limitations regarding type of documents had to be done. To ensure the availability of texts, understanding in terms of language, and insight in relation to the conceptual approach of the thesis, academic texts in the form of articles were chosen as the form of documents to be analysed. The next section will go deeper into the process of collecting and selecting the texts.

3.3.3 Collecting and selecting the documents

The collection, synthesis and analysis of the research documents on the Code river area has been central all throughout the project period. As discussed above, the reading of research

literature regarding the Code river was central in the initiation of the project. The first batch of documents I got through the contact person at CitRes, as mentioned above. Based on these, I started to get an overview of the Code river area as a possible study area. I then sorted them after research theme and tried to find similarities and discrepancies between them. However, this initial round of analysis was mainly done to get a picture of the Code river area as a possible research site, and the non-academic sources was also included in this process. These was particularly useful for trying to get a sense of the place, how it looked, how people in general and when visiting related to it. Their impressions of the place, whether it be the colourful houses or the view from the bridge or the different shops and people that live there. It is important to emphasise, though, that it is only the academic documents that is analysed in the document analysis.

Therefore, the sampling method used was a mixture of purposive sampling in the start and developed into a combination of purposive sampling and snowball sampling (Bradshaw & Stratford, 2010). The snowball sampling became particularly central in the method towards the end, as I got a closer connection to the material. Finding text through the citations in other text that was related to the same theme was a way of finding similar research or examples of other themed studies of the same case. This last activity does, however, risk producing a “citation bias”, as the sample of texts retrieved from reference lists may “produce a biased sample of articles”, resulting from the author citing articles that support their position (Song et al., 2010, p. 3).

It does also produce some bias regarding the theme, origin, and quality of the literature. Not having found the initial batch of empirical literature myself, further cements the bias into the text, as I have limited opportunity to be aware and take precautions measures to deal with the bias. This bias corresponds to what Booth et al. (2016, p. 202) presents as “publication bias”. Based on Song et al. (2010), it is a bias which deals with the overall bias connected to language, location and database. Being aware of and recognising the limitations is important, as discussing the biases is important in making the readers aware of it, and how it influences the research (Booth et al., 2016, p. 199).

After the collection and initial reading of the literature, I added more academic documents that I found through my own search, mainly through Google Scholar, online library resources, and the Web of Science database. The point of departure in this search was the authors I had read in the first round, to find further relevant information from these same scholars, which also

represent a way of producing citation bias as discussed above. I also searched more broadly by using “Code river”, “Kali Code”, “kampung”, “urban river”, “urban water management” as central keywords.

Yin (2014, p. 148) refers to the objects collected in a study (documents, artifacts, and archival records) as “another form of primary evidence” (p. 148), as they are directly related to the study topic, and are primary information regarding a central part of the research theme. This perspective puts into question, then, whether a particular piece of information, whether it being journal articles or archival records, de facto is primary or secondary data. In my case, this is a relevant discussion as the role of the academic documents in the document analysis is as primary empirical data, on which the subsequent analysis and discussion in connection with the conceptual framework and research questions are concerned. However, despite this view, the documents are still produced by someone else, and has thus gone through several stages of interpretation. In this regard, it is important to evaluate the documents (Bowen, 2009). This is a central part about ensuring validity of the data (Kitchin & Tate, 1999).

3.3.4 The characteristics of the academic documents – an evaluation

A central characteristic of the documents being analysed, is that they can be understood as secondary data. When using secondary data, one must be aware of some of the characteristics that have implications of our use of it. One of these are part of what makes it different from primary data, namely that secondary data has been produced by someone else, and with a different purpose (White, 2010). This has implications for the reliability of the data. One can never be completely sure of how the data has been collected and analysed, and what inherent bias the researcher may have had in the process of producing it. Also, remembering that different documents were originally written with another audience than the case study in mind, enables an identification of the original objectives and therefore diminishes the chance of being misled by the evidence (Yin, 2018, p. 116).

The total number of documents collected and read and found to be possibly relevant to the aim of the thesis, is 30. These are used in varying degrees, as some of them deal with themes that goes through the whole analysis, while some are mentioned once. 23 of these were found relevant for the analysis. As the appendix provide an overview of, the documents also vary a great deal by the type of academic text they are, and the literary quality and the research. Of the 23 texts, 10 of them are conference proceedings, 7 are peer-reviewed journal articles, while three articles are journal articles, with no information confirming them to be peer-reviewed. Additionally, there are three texts that are theses or other kinds of published student work: one

master theses, one PhD-thesis, and one published fieldwork report. The criterion for the selection was that they in some degree is based on an empirical study of the Code river area conducted sometime during the last couple of decades. This means that they mention both the river and the urban settlements on the riversides in some way or another. They must also be written in English. The six that did not make the cut were found not relevant enough in terms of the themes of the analysis and the discussion.

The quality of the literature varies a great deal. Not surprisingly, the peer-reviewed articles are those who distinguish themselves with the highest quality, while the quality of the conference proceedings varies a lot. This is amongst other things reflected in the high number of citations of other conference proceedings or even power-point presentations and lectures, with no indication of the original published or non-published origin. This could be the result of the lack of peer-reviewed articles of research done on the Code river. This infringes the quality of the proceedings themselves. However, the theses and other student work using Code river area as an empirical field bear characteristic of being thorough work resulting from varying lengths of fieldwork, and I consider them thus to being valid sources of analysis and could maybe also be considered more reliable than some of the conference proceedings, of which are in some cases are seriously lacking in both terms of reliability and validity.

The authors and the background should also be accounted for. Most of the authors are believed of being of Indonesian background, although it is not always clear whether they are originating from Yogyakarta, some other place in Indonesia, or the Code river area itself. If the latter is the case, it is mentioned in the text, which for example is the case of Setiawan (1998). Guinness (2020) also notes that he has lived in the area.

Overall, the research literature on the Code river area varies a great deal both in types of text, quality, and themes. Although the low academic quality is the most pronounced issue with the literature, the number of text and their variations in themes are nonetheless an indication that this is an interesting and relevant area of doing research. It must be questioned, however, if the varying quality of the texts could be infringing the validity of the analytical results of the document analysis. If the goal of the document analysis was to find and study the actual empirical conditions of the relation between the river and the city, the academic quality of the texts would be important. However, as the goal of the document analysis is to analyse different perspectives within academic texts on the Code river area through an engagement with UPE, it

is not necessarily the empirical data that is important, but the focus and perspectives of the texts and how UPE can be used to understand them.

3.3.5 Analysing the documents

Finding common themes and perspectives within the documents have been central within this thesis from the start, from the initial reading of literature regarding Yogyakarta and Code as a potential case study area as described earlier, until the analytical stage. This has involved reading and re-reading the literature several times and identifying common themes and patterns within the research in relation to the overall aim of the thesis. Bowen (2009) presents two analytical processes related to document analysis. These are content analysis and thematic analysis. The above process can be understood, then, as thematic analysis, as it involves “pattern recognition within the data, with emerging themes becoming the categories of analysis” (Fereday & Muir-Cochrane, 2006, p. 82).

The approach of thematic analysis closely related to how primary qualitative data also are coded and analysed, as described by Cope (2010). Here, descriptive codes and analytical codes are central. Thus, these descriptive themes found through the thematic analysis of the documents are therefore the foundation for the discussion conducted in chapter 9. These perspectives are then discussed through the employment of concepts of UPE of water.

3.4 Critical reflections on the project

This project is not without its pitfalls. Especially the nature of the project as a desktop study should be critically considered thoroughly, in addition to the ethical considerations of doing cross-cultural document analysis. Not to mention the emphasis on conceptual work, which requires a steady handling of the concepts and theorizations. Being self-critical of the work and being aware and constantly considering the ethical implications of our research is key in doing research (Dowling, 2016).

Reflexivity is defined by England (1994, cited in Dowling, 2010, p. 31) as “a process of constant, self-conscious scrutiny of the self as researcher and of the research process”. Being aware of how issues of objectivity, subjectivity and intersubjectivity has influenced the work is also important in this regard (Dowling, 2010). Keeping a diary has been central in the daily work with this thesis, which Dowling (2016) emphasises as being a way of making critical reflexivity a less difficult process. The diary has been a place where I both have written about what I am working with, and how I’m doing while working with it. In so doing it has been a handy tool helping me keeping me on track with the process, while also providing a place for

me to constantly think about the work I'm doing, the way I'm doing it, and how I'm coping with it. However, as the work of this thesis has involved me, myself and I in relation to the theoretical literature and the academic texts regarding Code river, the reflexivity has revolved less around how I'm working out there in the field in connection to informants as often is the case in qualitative work, and more about my own position and expectations in working with the material and my connection and understanding of the physical place of Code river area.

This in some ways sums up how the issues of objectivity and subjectivity have relevance in this desktop study. Subjectivity is emphasized in qualitative research, as it is part of the nature of data collection and analysis (Dowling, 2016, p. 39). When it comes to my research, the level of subjectivity must be considered, as "your everyday understanding of the world help you decipher texts" (Dowling, 2016, p. 39). My understanding of the theoretical framework, the concepts, Yogyakarta city and Code river area are all influencing how I understand, interpret and analyse the academic texts. I have essentially read the texts and analysed through my personal lens of analysis, which has influenced the resulting understanding of analysis.

This also refers to the positionality of myself and how this influenced the work and the results (Mullings, 1999). One obvious element in the interpretation of texts is my position as an outsider (Dowling, 2016). In this case, I am not only an outsider in terms of my nationality and ethnicity, but I am also an outsider literally speaking, as the work has been done half a world away from the physical place of which the academic texts are concerned. Being an outsider can lead to less reliable interpretations (Dowling, 2010). However, my position as an outsider to the situation in Yogyakarta can also have positive consequences as this allows me to see the situation from the outside, and thus maybe being more objective in my understanding and analysis (Mullings, 1999). However, it is important to remember that the outsider/insider dualistic is in reality not a fixed thing, and as such it is possible that my position has developed throughout the research process (Mullings, 1999).

Moreover, my position as a geography student can also have influenced the understanding and interpretation of the different research literature, and thus produced a bias towards familiar texts. I have a broader basis of understanding text that I am used in reading, than studies within engineering, for example. This could lead to the analysis of the familiar text is more thoroughly interpreted, while the analysis of the unknown text revolves more about understanding what they are about and seeing them within the different perspectives.

The outsider/insider perspective is also possible to consider in connection with the academic texts concerning the Code river area. The authors of the articles are in many cases also from the outside, from other parts of the city, or from another class than the people they are studying. They bear with them their own bias and views that shape their work. It is possible that there's a risk of double bias, as both my position and the author of the original work bring our own perspectives to the table. This is important to keep in mind when analysing and discussing the texts. In some cases, it could be relevant to seek out information regarding the background of the author. Is this someone that knows the area from before, or are they from the outside? Are there any particular views that are recurring throughout the documents? Being a critical reader is important in this case, in addition to being aware of the possible positions in the analysis. Some of this is accounted for in the section 3.3.4 above.

As this is a conceptual study based on analysis of academic texts concerning the Code river area in Yogyakarta, Indonesia, I would argue that it can be considered to be a cross-cultural study. As Gibbs (2001, p. 674) puts it, cross-cultural research is "research that take place across, or between, cultures". The issues discussed above, also comes into consideration here. My position as a white, female Scandinavian that have never been to Indonesia or Asia for that sake, is important to reflect upon. All my views and understandings are therefore built on my own interpretations of other interpretations. My understandings and views must therefore be seen in connection to my own internalized interpretations and understandings. Additionally, the project being a cross-cultural study results also in limitations related to language. Only being able to consider texts in English, both in terms of theoretical literature and the academic texts considering the Code river area, has resulted in a limited analytical perspective, as possible perspectives within non-english texts on the same field have been excluded. Although some texts, especially in terms of the physical, social and political contexts of the Code river have been translated by the use of online translation tools, it nonetheless influences the validity and reliability of the research as it only presents one part of the whole picture.

Based on the discussions above, there are several issues connected to the validity and reliability of the project. This is reflected in the overall design of the project as a desktop study, which naturally brings with its some limitations when compared with pure qualitative or quantitative projects, influencing the rigour of the thesis (Bradshaw & Stratford, 2010). Additionally, the possible bias discussed is also influencing the overall quality of the project. I also think that my awareness of the original plan of the project in some ways made it easy to compare the project to what it is not, rather than what it has become. This is something that doesn't provide any

insight into the actual strengths of the project at hand, which I do think is substantial considering Wegerif's (2020) discussion regarding the value of conceptual research as desktop study. The conceptual approach will be the focus in the following chapters.

4 Urban political ecology

Having accounted for the two approaches the project is built upon, I will continue with the conceptual approach of the thesis. In chapter 2 I established the theoretical background of this thesis and introduced how water in the city is a field of research where concepts within more-than-human geography and relational thinking can be beneficial. This chapter will further engage with UPE as an analytical and theoretical framework and is therefore engaging with research questions 1b and 1c and lays the foundation of the engagement with research question 2b and 2c. First, an introduction to political ecology will be given, before UPE will be discussed as a continuation of the political ecological project. Then, I will present and discuss the latest developments of the field, how an engagement with these can benefit the thesis.

4.1 Political ecology and the turn towards urban issues

Credit is often given to Blaikie (1985) and Blaikie and Brookfield (1987) for developing the original approach of political ecology (Castree, 2011; Zimmer, 2010). This approach was dealing with “understanding how local resource use was being affected by wider social forces, and the accent was on asymmetries of power between ordinary people and the various actors (e.g., national states and multinational companies) affecting those peoples’ lives” (Castree, 2011, p. 292, emphasis in original).

Since the 1990s, political ecology has grown a lot and Robbins (2011) argue that it is, in fact, not a single theoretical framework nor a theoretical view. Rather, he sees it as a broad field of understanding of the relations between political forces and different ecologies of the environment. Furthermore, he sets out to describe political ecology as something people do, rather than as a body of knowledge. It is a community of practice, that unites researchers by the common questions that many grapples with (Robbins, 2011, pp. 4-5).

There are several different definitions of political ecology, as Robbins (2011) points out. But they all more or less it builds on the premise “that environmental change and ecological conditions are the product of political processes” (Robbins, 2011, pp. 19-20). Political economy is central to the development of political ecology, as it also can be understood as “an approach rooted in political economy and cultural studies and critically branching out to understand relationships between society and the natural world” (Keil, Bell, Penz, & Fawsett, 1998, p. 1). Keil et al. (1998, p. 11) also clearly explores the connections with political economy and discuss

how an engagement with this “will result in a better understanding of political ecology” as a whole. This could stem from the origin of political ecology from the ideas of production of nature and Smith’s (1984) *Uneven development*, as explored in chapter 2.

This connection also comes to light when explaining the backdrop of the definitions of political ecology. Here Robbins employs the difference between *political ecologies* and *apolitical ecologies*. If political ecologies exist, then also an *apolitical* ecology must exist (Robbins, 2011, p. 14). Looking at several different definitions of political ecology, Robbins (2011, p. 14) finds that they have in common that they represent an alternative explanation to the *apolitical* ecologies. A common target of political ecologists is the Malthusian view of population growth leading to environmental degradation, in addition to the modernization accounts, that advocate for a ‘development’ based on economic efficiency, conservation, privatization, and individualization of previously ‘common’ resources (Robbins, 2011, pp. 14-20). These supposedly ‘apolitical’ approaches, are, as Robbins (2011, p. 19) argue, inherently political in their assumptions and explanations of the world, as they tend to ignore the political economy on which their view is built.

Political ecology emphasizes the political assumptions these apparently apolitical approaches are built upon and is “explicit in its normative goals” (Robbins, 2011, p. 19). This can be better understood when remembering its relations to historical materialism, as focused upon in chapter 2, where the transformation of nature into labour and the productive relations within the capitalist system creates different power relations and a class system.

Due to this then, it is no surprise that political ecology has grown to be an important approach and dynamic research field (Keil, 2003, 2005; Zimmer, 2010). Issues like soil degradation, biodiversity, climate change, access to water, conflicts around protected areas and environmental issues in general are just some of the research areas that are focused on within political ecology (Zimmer, 2010). The earlier stages of political ecology, that Castree (2005, p. 82) calls “Third world political ecology”, was also research where these themes stood strong.

However, Heynen et al. (2006, p. 2) and Zimmer (2010) have argued that the urban environment tends to be overlooked in writings within political ecology, as the focus on the global environmental problems, led to the urban origin of these problems had been given little attention. Zimmer (2010, p. 343) argued that an exclusion of these themes in the urban context would be an error, “as this would entail ignoring a growing range of ecological problems and

putting aside conflicts around the environment in which more and more people live, and which more and more people endure and shape their everyday lives”.

Because now, with more than half of the world’s population living in cities, and the city in the more recent years being introduced as the solution for the climate and environmental problems (Keil, 2020), the turn towards an urban political ecology was “well overdue” (Keil, 2003, p. 728). Considering how the city is increasingly being called upon to “save the world” (Keil, 2020, p. 2364), this perspective emphasise the relevancy of UPE in today’s world.

4.2 Urban political ecology: a political ecology of the city

Although urban political ecology in general is understood as a subfield of political ecology (Rattu & Véron, 2016), Goldfischer, Rice, and Black (2020) presents an interesting view on it. They describe how the emergence of an urban political ecology happened as urban theorists “discovered” the importance of nature in the city, and political ecologists shifted their gaze upon the city, a political ecology of the city has been developing from the 1990s until now (Goldfischer et al., 2020, p. 3). UPE can therefore be understood as a joining of two strands of research that discovered new ways of understanding nature and the city, creating thus an urban political ecology, with background both from Marxist urban geographies and third world political ecology.

In addition to its focus on urban areas, UPE especially concerns itself with theorising the relationship between nature and the city (Zimmer, 2010). As Keil and Boudreau (2006, p. 42) puts it, “the major point [...] of UPE is that the domination of nature and the domination of humankind are connected processes and that these processes come together in the urban”.

Erik Swyngedouw’s 1996 article “The city as a hybrid: on nature, society and cyborg urbanization” is often referred to as the initial theorization of an urban political ecology. Here, he builds on Harvey’s (1996) argumentation of the fact that there is “nothing particularly unnatural about New York City” (Swyngedouw, 1996, p. 66), and argues how the city is a “hybrid socio-natural “thing”” where “society and nature, representation and being, are inseparable” (Swyngedouw, 1996, p. 66, emphasis in original). He notes how although there had been an increase in research on political-economic perspectives in urban studies, “only a few of them tried to build bridges with ecological movements” (Swyngedouw, 1996, p. 67). This he finds surprising when considering the foundations in Marxism and historical materialism, which as we already know, saw production of nature as central to the processes of society.

Therefore, as Keil (2020, p. 2361) argue, “the original motivation for UPE thinking”, builds on the “processes of destruction of nature through capitalist urbanisation and the simultaneous creation of new, mostly money-based metabolisms”. This emphasizes the fact that UPE is a critical urban theory, stating that “nature *is* the city. Nature *is* the urban” (Keil, 2020, p. 2360, emphasis in the original), and in so doing emphasising how capitalist urbanization is “a complete urbanization of society” (Lefebvre, 2016, p. 121, cited in Keil, 2020, p. 2361). This perspective is connected to its roots within historical materialism discussed in the previous chapter. We also see this through the focus on the socio-ecological inequalities as a the result of capitalist urbanization (Swyngedouw & Kaika, 2014).

Writings in UPE sees the city as a type of nature that is constituted by metabolic processes (Rattu & Véron, 2016). Just as political ecology focuses on the interdependence of ecologies and the political processes, UPE focuses on the interdependence of the ‘ecological’ and the ‘urban’ and its processes (Tzaninis, Mandler, Kaika, & Keil, 2020). Furthermore, there’s an understanding of the urban as “a process of continuous socio-ecological transformation” (Tzaninis et al., 2020, p. 4). As summarized by Keil (2003, p. 728): “One of the main insights shared by most authors in UPE is that the material and the symbolic, the natural and the cultural, the pristine and the urban are not dual and separate realities but rather intertwined and inseparable aspects of the world we inhabit” (Fischer & Hajer, 1999; Keil, 2003, p. 728). The process of metabolism is therefore a central concept of UPE’s understanding of the city.

The focus of UPE is therefore not, as Tzaninis et al. (2020, p. 3) puts it, the environment or the city itself, but rather “the urbanization OF nature, i.e., the process through which all types of nature are socially mobilized, economically incorporated (commodified), and physically metabolized/transformed in order to support the urbanization process” (Swyngedouw & Kaika, 2014, pp. 462-463, emphasis in original). The materiality of nature and the metabolic processes of socionature, and how these interact in the city is therefore central within UPE (Keil & Boudreau, 2006).

Furthermore, UPE brought to the table the realization of the importance of the urban society through what Angelo and Wachsmuth (2015, p. 20) call “the Lefebvarian moment”. This is connected to what Keil (2003, p. 725) describes as “the realization that what we call “the urban” is a complex, multiscale and multidimensional process where the general and specific aspects of the human condition meet”. In other words, Henri Lefebvre (2003) called to re-evaluate the

relationship between the city as a “socio-natural form and urbanization as a global socio-natural process” (Angelo & Wachsmuth, 2015, p. 20).

Based on the above then, UPE brings together the theorization of socio-natures in the city, and the importance of the urban in the understanding of the human society. It is therefore clear then, how the perspective of UPE provides a fruitful framework of understanding the urban river. As it sees the city and the things in it as hybrids which are internally related to each other, “internalizing the multiple contradictory relations that re-define and re-work every body and thing” (Swyngedouw, 1996, p. 70), the river is then a hybrid socio-natural thing which are an internal part of the processes of urbanization.

Taking into considerations the ongoing debates within UPE, it is a field which since its beginnings in the early 1990s are still developing and finding its footing. In the next section, these will be presented and discussed. How can these debates and discourses provide new insight into the research on the Code river area?

4.3 Ongoing debates in urban political ecology

UPE as a field of research is continuously evolving, and the last year at least two publications tried to get an overview of the different streams. Using the writings of Keil (2020) and Tzaninis et al. (2020), I discuss three larger streams or discourses within contemporary UPE. First, they both identify a discourse engaged within the planetary urbanization discourse. The discourse, led by Angelo and Wachsmuth (2015, p. 23), emphasize the “Lefebvrian roots” of UPE, and offers a critique of the alleged methodological ‘city-ism’ in UPE (Tzaninis et al., 2020). The second discourse, both Keil (2020) and the authors of Tzaninis et al. (2020) identify as a call for a more situated UPE from scholars working in and with the global south, led by Lawhon et al. (2014). These two discourses will be elaborated on and discussed in more detail below.

Keil (2020) also discusses a possible third discourse, one fronted by Connolly (2019), that are bridging the gap between classical UPE and the challengers of this, by focusing on how cities are also influencing and urbanising “non-human natures” (Connolly, 2019, p. 64). This discourse was developed as an answer on the critique put forth by Angelo and Wachsmuth (2015) in the first discourse and is thus an example of how the divisions of the streams or discourses is not set in stone but build and develop in relation to each other.

Tzaninis et al. (2020) also identifies two additional discourses. One that focus on the rift between the academic debate in UPE and the actual policies, while the other “address the conceptual and methodological challenges around researching human and more-than-human

actors” (Tzaninis et al., 2020, p. 6). The latter discourse could seem relevant in this case, but as it focuses on more-than-human actors such as animals, soil, concrete, and air, as part of the mission to create a more-than-urban political ecology, this won’t be further discussed here.

In the following section the second discourse, the situated UPE will be presented and discussed. This will help with inform how UPE can contribute to a study concerned with the urban river area of Code in Yogyakarta. Then, the first discourse will be discussed by employing Connolly’s (2019) response to it the very same criticism proposed by the discourse. The reason for this is because the response to the critique emphasizes the socio-natural metabolism that happens in cities and offers thus an initial explanation of the importance of these concepts in UPE and how this connects to UPE of water.

4.3.1 Southern theory in UPE – creating a situated theory of UPE

Situated UPE is interesting in this regard as it builds on the problematizing of the application of northern theories on southern contexts. By proposing a more theoretically heterogenous UPE, the authors Lawhon et al. (2014) aims to create “a more situated UPE which creates the possibility for a broader range of urban experiences to inform theory on how urban environments are shaped, politicized and contested” (Lawhon et al., 2014, p. 498). The authors point to the fact that much of research in UPE builds on a Marxist framework in which the critique the perspective offers, requires (often radical) systemic change. However, UPE has, as the authors argue, “failed so far as to provide critiques which do more than point to the need for change” (Lawhon et al., 2014, p. 502). This provides a ground on which to build a more heterogeneous UPE. Lawhon et al. (2014) proposes southern theory, and more specifically, African urbanism, as a potential building ground for expanding the field.

Lawhon et al. (2014) draws on Southern theory as articulated by Connell (2007) and the term ‘provincializing’ by Chakrabarty (2007) to create a situated UPE. Southern theory has the goal to expand the understanding of what can develop theory. With a particular focus on social theory, Connell (2007) points to the fact that ‘northern theory’ presents itself as universal knowledge, while the (previously) colonized world, the southern world, are at the margins. The underlying assumptions and categories are produced “in the metropole”, as Connell puts it, and they do not necessarily communicate with the ideas of the colonized world (Connell, 2007, p. xi).

Building on this, situated UPE is to a large degree connected to the place and concerns itself with developing an understanding of northern theory as not necessarily the standard. It does

this by expanding the scope of theory, and by that “widen the range of sites that speak to theory” (Lawhon, et al., 2014, p. 504). In other words, placing the global south as the ground of theorization, as the epistemological location, rather than using it as an example of “failed cities” when analyzed through Northern theory, can expand the scope of UPE (Lawhon et al., 2014, p. 505).

Furlong and Kooy (2017) supports this view in their analysis of the water network in Jakarta, Indonesia. They also engage with the concept of ‘worlding’, which also is connected to Chakrabarty’s call to ‘provincializing Europe’. This relates to the challenge of seeing Europe and northern theory not as the universality of theory, but to decenter it and understand that European explanations are only partial. Building on McCann, Roy, and Ward (2013), Furlong and Kooy (2017, p. 890) states that ‘Worlding’ urban theory includes “taking the Southern cities as sites of theoretical development, taking the richness of the everyday activities of urban dwellers as the basis for rethinking urban theory, and putting Southern cities on an equal footing with their Northern counterparts in the epistemic imaginaries of researchers and practitioners”. In their study of water governance in Jakarta, Furlong and Kooy (2017) show how a decentering of the network can open possibilities to engage with ecological connections of different flows of water. The flow of water does not only happen in piped networks, but also in non-networked flows (Furlong & Kooy, 2017).

Kooy and Walter’s (2019) study of packaged drinking water (PDW) in Jakarta serves as an example of how situated UPE bases itself on southern theory by Connell (2007). Traditional analyses of PDW supply have been focused on understanding PDW as a consumer product, not as a form of necessary water supply. This leads to analyses of consumer practice and choices, studying advertising and marketing, mirroring the way PDW is understood in most social science studies - as a consumer product, and as a luxury. This could be seen as an example of how northern thought and theory is applied on southern realities, that do not necessarily have the same historical background of water supply. This is similar to studying water supply through the piped network as standard. Related to this, Bakker’s (2003a) study of water supply in Jakarta concludes with a proposition of using the term ‘archipelago’ as a metaphor opposed to the term ‘network’ for describing the strategies of urban water provision in the South.

The above-mentioned concepts and terms can be seen in direct relation to the situated UPE as Lawhon et al. (2014) describes. In addition to these, Lawhon et al. (2014, p. 507) explores how everyday practices can be a way of making theory within a situated UPE. The work within

African urbanism by Simone (2004) focus on people as infrastructure, and thus also how material flows through people in the city. The “ordinary practices of city-making”, then, becomes the ground of theorization (Lawhon et al., 2014, p. 507). Through everyday practices, the everyday city-making come to light, thus allowing for a theorization of what the city is, how it works, whom it is for, and how it can be changed (Lawhon et al., 2014). This perspective entails a different understanding of what power is. Within this view, power is understood as diffuse and relational, enacted through forms of identity and situations (Lawhon et al., 2014). All this has a consequence for practice and critique within UPE, as the focus on everyday practices “opens up new spaces through which to derive alternatives for understanding and creating change” (Lawhon et al., 2014 p. 510).

This perspective is relevant for the empirical approach of this thesis. The acknowledgement that northern theory may not be sufficient in the southern city is important. As Indonesia is a country whose history is shaped by colonialism (Vikør & Filseth, 2018), I find value in acknowledging this and therefore also situate the study within a framework of theory that don't try to fit the case within the framework of northern thought and urbanism. A situated UPE in this regard, as understood through a worlding of urban theory, allow for an analysis of the urban river as seen through the everyday practices, and that through this, forms of power come to light through identities, discourses, and situations. Moreover, this enables a focus on the people in the Code river area as active agents in creating their everyday life, and thus also agents of power in the city-making. Through a situated UPE of water, the river can be analyzed as a water flow outside the network and understood in relation to its city, its environment, and its people.

4.3.2 The critique of UPE's focus on traditional urban centres: socio-natural metabolism answers

The other strand of UPE that will be focused on here, is the critique of early UPE's focus on traditional urban centres. Perhaps inevitable, lately there has been an increasing in calls for a focus in UPE that also consider the periphery of urban areas (Tzaninis et al., 2020). The focus has been on the fact that most writings within UPE has mostly been concerned with the city within traditional city boundaries and borders, with the result that writers in UPE has failed to view the periphery as a part of the urbanization processes (Connolly, 2019; Tzaninis et al., 2020). This view is anchored within the discourse of planetary urbanization, which emphasize “Lefebvre's challenge to create an urban science for an urban world” (Keil, 2003, pp. 728-729).

This critique has mainly been led by Angelo and Wachsmuth (2015), and focuses on exactly this, namely that the work in this field has been too focused on the traditional boundaries of a

city and urban areas and are thus failing to consider urbanization as a process which extends far out of the traditional city limits (Connolly, 2019). Angelo and Wachsmuth (2015, p. 23) propose a political ecology of urbanization (PEU), to “move beyond the city”. Batubara et al. (2018) engages with this field in their study of flood infrastructure along the Ciliwung River in Jakarta. Here, they explored the measures taken to prevent river flooding through a “river normalization”-project, which included dredging of the riverbed, laying concrete tracks between the river and the settlements, and the construction of dikes. They found that this process “is interwoven with socionatural transformations that happen through land conversion” (Batubara et al., 2018, p. 1195), concludes with that urban flood infrastructure is part of “wider processes of uneven urbanization”.

In an answer to the critique by Angelo and Wachsmuth (2015), Connolly (2019) argues that UPE indeed has strands that have moved beyond the city in its analyses. For example, in response to the critique from Angelo and Wachsmuth (2015), Connolly (2019) points out that much of Lefebvre’s writing actually understood the urban and nature as opposites, and therefore a lot of UPE writing have instead based itself on Marxist political economy instead, which sees nature as central to the processes of urbanization.

Connolly (2019, p. 54) refers to the concept of socio-natural metabolism and argues how this concept “actually enabled urban political ecologists to problematize and question the binaries (between, for example urban and rural, society and nature) that had for so long plagued urban studies and previous forms of ecological thinking” (emphasis in original). The concept of metabolism, together with the concept of circulation, creates a metabolic circulation that “is the socially mediated process of environmental– including technological –transformation and trans-configuration, through which all manner of ‘agents’ are mobilized, attached, collectivized, and networked” (Swyngedouw, 2006a, p. 113, emphasis in original). Connolly (2019, p. 66) argues how through an engagement with this concept, UPE research “demonstrates that the socio-natural flows and interactions taking place within the city are not bounded within that local site”.

Building on its first critique, Angelo and Wachsmuth (2015) also argue that UPE has not developed a proper research program which includes how urbanization as a process also happens beyond the city. Here, Connolly (2019) points to the works by Swyngedouw (2004), Kaika (2005) on flows of water are examples of how UPE studies of water move “beyond the

local to understand the broader ensemble of socio-ecological relations out of which specific urban forms are produced” (Loftus & March, 2016, p. 59).

Therefore, a focus on water in UPE as done in this thesis is valuable in the sense that it enables us to see the urban and the urbanization processes as something that happens not only in the city centres, but as water moves through the city, it is connecting urban centres to the sub-urban areas and vice versa. Through the research on nature that flow within cities, one can show how “socio-natural flows and interactions taking place within the city is not only bounded within that local site” (Connolly, 2019, p. 66), and through this also answering the critique from those who advocate for a UPE engaging with the ideas of planetary urbanization.

The focus on flows of water in urban areas as done in this thesis can therefore be a way of including the sub-urban perspective in urban studies of water like Tzaninis et al. (2020) is calling for. This also answers to the critique put forth by Angelo and Wachsmuth (2015), while also acknowledging that urban water is also part of suburbanization processes. The flow of water like the Code river is, through its natural capacities as a flow of water, connecting places and spaces not only within the traditional city boundaries of Yogyakarta, but also the whole region.

4.4 Summary

This chapter has presented political ecology and UPE, in addition to focusing on the recent debates within different discourses of UPE. This has enabled a consideration of how these developments could benefit this thesis, and engages then, with the research question 1c regarding the theoretical and empirical possibilities of UPE. By engaging with a situated UPE, I situate my research within a strand of UPE that advocate for a more heterogenous UPE, which engages with southern theory, and that acknowledge that the field of UPE must take into account also other realities in its theorization. Everyday practices and diffuse forms of power are some areas which Lawhon et al. (2014) explores which could be relevant in this case. The chapter is therefore also connected to research question 2b and 2c, as these concepts will be central in the empirical approach.

The next chapter will go deeper into UPE of water as a particular strand of UPE. Here, a range of concepts connected to nature-society relations are discussed, with the question of what the river is as an analytical departing point on how to understand the urban river.

5 What is the river? An urban political ecology of water and the hydrosocial cycle

While the previous chapter introduced political ecology and UPE and discussed the recent developments of the field, this chapter will go deeper into the theorizations of water in UPE. Here I will engage with writings within UPE of water to explore what theories and concepts can be applied to understand the urban river, as per research question 1b. UPE of water employ concepts that define what water is through the hydrosocial cycle and the question of what water is, is therefore central in the use of the concept (Linton & Budds, 2014, p. 171). This way, the understanding of the urban river through the concepts of hybridity, materiality and resource will provide a conceptual foundation on which the nature-society relations of the Code river area can be understood, and the work here is therefore connected to research question 2b and 2c. The engagement with the development from the hydrologic cycle to the hydrosocial cycle and hydroelectics (Linton, 2010), furthermore emphasise the ontological and epistemological work of UPE of water.

First, I will introduce UPE of water as a theoretical field, before the hydrosocial cycle and hydroelectics are presented and discussed. Then, the concepts for understanding the urban river through the hydrosocial cycle will be accounted for. Finally, I will discuss the possibilities of using the hydrosocial cycle in research.

5.1 Urban political ecology of water

UPE of water has become a distinct sub-field within political ecology, that “has been in the forefront of developing new approaches to human-environmental relations” (Loftus, 2009, p. 954). This has happened through a development within this branch of political ecology that has focused on water itself as something that shapes relations of power by embodying and expressing social relations (Ekers & Loftus, 2008). This relates to the focus on the material as something that exhibits power, through metabolism and circulation, highlighting the importance of infrastructure in the city (Swyngedouw, 2006; Lawhon et al., 2014).

Just as political ecology as a whole is interested in the influence of power, processes, and systems on ecological conditions and environments, UPE of water also focus on how water in the society is politicized and that political structures are constantly influencing how water and water resources are produced and distributed (Loftus, 2009).

Erik Swyngedouw's extensive work on the political ecology of water and urbanization has developed the framework of thought on which UPE research on water builds upon (Rattu & Véron, 2016). He builds on writings by Lefebvre (1991) and Latour (1993) and developed a conceptual and methodological framework that had its foundation in the critique of the traditional approaches within studies of the relationship between water and society, that in his view, failed to overcome the dualism of the nature/society divide. These traditional approaches saw parts of the hydrological cycle as separate parts that could be studied and understood as independent objects (Swyngedouw, 1999). Building on the conceptual foundations of UPE, this research understands the urban through the metabolic production processes of socionatures, where concepts of circulation and metabolism are central (Swyngedouw, 2006).

The acknowledgement that the functioning and expansion of cities are dependent on the capture and control of water resources, lies also at the base of the field (Rattu & Véron, 2016; Swyngedouw, 2004). Erik Swyngedouw's book *Social Power and the Urbanization of Water: Flows of Power* (2004) uses water as an entry point to understand the relationship between cities and nature. Through a study of the Ecuadorian coastal city Guayaquil, the many ways in which water and power intersect as water is transformed from 'natural' water to a metabolized form gives insight into the political ecological processes that shape urbanization. This work is an example of how studies within the UPE of water has created an understanding of how nature and the city cannot be understood as two separate things, but that "the urban process has to be theorized, understood, and managed as a socio-natural process that goes beyond the technical-managerial mediation of urban socio-ecological relations (Swyngedouw & Kaika, 2014, p. 466).

Furthermore, it shows how the socio-ecological processes are political, as they involve power struggles which often is based on class and gender (Rattu & Véron, 2016; Swyngedouw & Kaika, 2014). As Swyngedouw (2004) shows in his study of Guayaquil, the urban water supply system is based on relationships of socio-economic and political-geographic power, which determine in large degree who's getting water, quality it'll have, and at what cost.

The next section will introduce the hydrosocial cycle, a central concept within UPE of water. The concept encapsulates in its engagements the understanding of how nature and society are internally related through the circulation and flow of water. Following this, the concepts of hybrids, materiality and water as a resource will be dealt with through the question: "what is the urban river?".

5.2 From the hydrologic cycle to the hydrosocial cycle

A central concept within political ecological perspectives of water is circulation of water (Swyngedouw, 2006a, 2006b). The ways of which water circulate throughout the atmosphere and biosphere are common knowledge nowadays, and the hydrological cycle is an equally known concept. As Linton (2010, p. 105) puts it: “It has spilled beyond the confines of scientific discourse and inundated the popular imagination”.

Linton (2010) demonstrates how the idea of the circulation of water through a hydrologic cycle has been present in the scientific history of hydrology of a long time. However, the concept of the hydrologic cycle which formalized modern water to fit within the science of hydrology, goes only as far back as 1931, when Robert Horton presented it for the American Geophysical Union (Horton, 1931; in Linton & Budds, 2014). It had a major effect for the field of hydrology, an effect that Linton (2010, pp. 129-130) identifies as being similar to the effect W. M. Davies had with the “geographical cycle” for the study of landforms. The concept established the hydrosphere as study site of hydrology, and distinguished hydrology from other geosciences. A similarity could therefore be drawn from the development of geography as discussed in chapter 2, that hydrology also had the similar wish to establish their field as a scientific science built on generalizable models.

The hydrologic cycle is a model which depicts the ‘natural’ circulation of water and is identified through its independence from human involvement (Maidment, 1993). Linton and Budds (2014, p. 171) argue that this understanding of the hydrologic cycle builds on a view of nature that sees it as separate from human society, which only humans have the possibility to influence, thus legitimizing technological authority over water through water management and hydraulic engineering. This shows, according to Linton and Budds (2014), how the concept of the hydrological cycle, however general it may seem, was created in a specific political and social context. This places the hydrologic cycle (and the hydrosocial cycle) as part of the development of water management. This will be further elaborated upon in the next chapter.

The consideration of this model of water circulation in the study of the Code river in Yogyakarta would explain how the river is transporting water from the mountains toward the ocean, and that runoff from the city and input from other rivers become part of the river. It would situate Code in the global circulation of water through the physical nature. This is an example of the argument that the perspective of the hydrologic cycle on the circulation of water reduces the water to its chemical composition H_2O , and that it does this in a way that represents western thought (Linton, 2008; Linton & Budds, 2014). Furthermore, it has a “temperate bias” (Linton,

2010, p. 123). This bias stems from the western imaginary of water, originating from their own experiences of water in the temperate areas of the globe. The idea of a humid world created an apprehension towards arid land, seeing these as uncivilized and poor areas that had to be re-engineered by using western knowledge and technology (Linton, 2010, p. 123).

This political work of the hydrologic cycle is part of what Linton and Budds (2014) identify as a ground for needing to move forward in terms of understanding the workings of the water. Gleick (2000) identified a need for water management going in new directions, to depart from the ‘old paradigm’ where state agencies and major hydraulic engineering programs are the rule. He identified Integrated Water Resources Management (IWRM) as a new dominating water management paradigm.

As the world of water management is changing, Linton and Budds (2014) argue that there is a need for new ways of conceptualizing water, and a conceptualizing water that includes its social dimension. It is in this context they propose the hydrosocial cycle as a way of repositioning the idea of integrating the hydrology and the social, which IWRM aims to do. This shows how IWRM, despite of focusing on the integration of the social and the natural, is built on the understanding of nature and society as already separated (Linton & Budds, 2014, p. 172). Linton and Budds (2014) argue that the hydrosocial cycle can be a way of understanding the circulation of water in society, without presupposing the separation of nature and society. In the next section, I will present and discuss the definitions and a diagram of the hydrosocial cycle.

5.3 Definition and diagram of the hydrosocial cycle

The circulation of water is central also within the hydrosocial cycle (see figure 1). However, where the hydrologic cycle understands the circulation of water as a circulation of H₂O through the hydrosphere, the hydrosocial cycle represents an idea within hydro-social research which “envisions the circulation of water as a combined physical and social process, as a hybridized socio-natural flow that fuses together nature and society in inseparable manners” (Swyngedouw, 2009, p. 56). It engages with the ideas of a socio-natural metabolism as developed within historical materialism, and circulation as a central concept of socio-natural flows in the urban space, joining in an understanding of “circulation as a metabolic process firmly established as practice and as solid representation of the process of socio-ecological change” (Swyngedouw, 2006a, p. 112).

This focus on circulation was also part of how Bakker (2002, p. 774) defined the hydrosocial cycle back in 2002, when stating that “*water as a resource* circulates through the hydrosocial

cycle – a complex network of pipes, water law, meters, quality standards, garden hoses, consumers, leaking taps, as well as rain-fall, evaporation, and runoff” (emphasis in original).

Linton and Budds (2014, p. 170) define the hydrosocial cycle “as a socio-natural process by which water and society make and remake each other over space and time” (Linton & Budds, 2014, p. 170). Through emphasizing on the hydrosocial cycle as a socio-natural process, they aim “to transcend the dualistic categories of ‘water’ and ‘society’” (Linton & Budds, 2014, p. 171), like also Swyngedouw (2009) aims for with the theorization of the circulation of water.

According to Linton and Budds (2014, p. 175) Swyngedouw’s work on the hydrosocial cycle shows that “for him, the hydrosocial cycle denotes a hybrid physical-social process, the examination of which provides a way of gaining insights into wider processes of capital accumulation, uneven development and social inequality, and the power of relations therein”. Linton (2010) builds on the work by Swyngedouw in his book, and “proposes the hydrosocial cycle as a framework for a relational-dialectical approach to water, whereby particular instances of water become embedded in social relations while at the same time providing sites for changing those relations” (Linton & Budds, 2014, p. 175).

Linton and Budds (2014, p. 170) wish to take the theorization around the hydrosocial cycle further, as although the concept has been present in research for some time, they mean that the use and definition of the concept lacks coherence. By going back to the hydrologic cycle as starting point of this concept and show in that motion that the concept of the hydrologic cycle is not neutral, “but can be regarded as a social construct with political consequences” (Linton & Budds, 2014, p. 171). Bearing in mind Robbins’ (2011) introduction of political ecology, this could be viewed as an example of how the field aims to show how seemingly apolitical ecologies are inherently political.

Linton and Budds (2014, p. 176) present a diagram or model of the hydrosocial cycle as a socio-natural process “by which water and society make and remake each other over space and time” (see figure 1). Here, water understood as H₂O, is incorporated in the cycle as the hydrologic processes and the agential role of it through its materiality. It is not only a physical flow of water, but “agents of social change and organization” (Linton & Budds, 2014, p. 176). As conceptualized in the diagram, the materiality of water influences the social processes of power and structure and which in turn create forces that intervenes with technology and infrastructure that again determine the quality and quantities of flows of water in the society. The cycle come to a full end as these forces also influence the materiality of water. Through this socio-natural

process, “water becomes and reveals itself as a socio-nature”, as water, society and technology become hybrids that internalize their relation to each other, and different meanings of water emerge, creating a “particular kind of hydrological (or scientific) knowledge” (Linton & Budds, 2014, p. 176).

This diagram demonstrates how the understanding of a particular flow of water is a result of a process in which both the materiality of water (H₂O), social processes and structures, and technology and infrastructure create together a particular knowledge that again “reflect the social order of which it is part” (Linton & Budds, 2014, p. 176). Additionally, this cycle is also a “dynamic historical and geographical process”, meaning that it is a constantly changing and transformative process (Linton & Budds, 2014, p. 176).

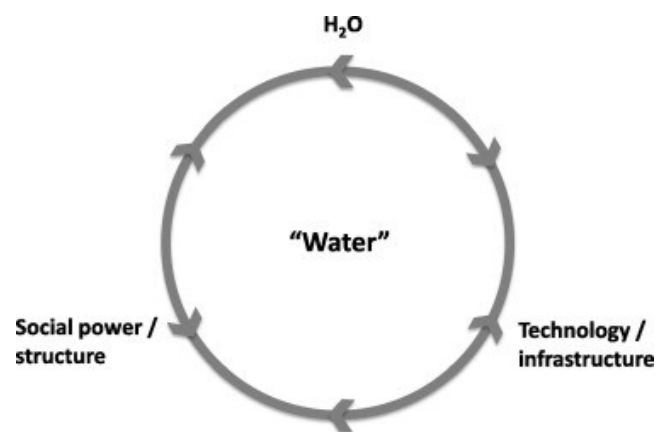


Figure 1: Diagram of the hydrosocial cycle. Source: Linton and Budds (2014, p. 176)

5.4 Hydroelectics

The hydrosocial cycle serves as a framework for what Linton (2010, p. 223) calls “hydroelectics”. He describes it as “a practice of social hydrology”, that “conceives of a water process out of which particular instances of water get fixed, or instantiated, in social relations”. Linton (2010, pp. 223-224) argues that what water is, can only be understood through its relations. Knowledge of water and what it means are inherently influenced by our relation to it. Water is therefore not something that is “self-identified”, but it is a process that happens through us, and water is therefore realized by someone, and changed through social relations.

By using the hydrosocial cycle as a framework for hydroelectics, Linton (2010, p. 229) states that “we can consider the hydrosocial cycle as having ontological and epistemological relevance”. The claim of ontological relevance Linton builds on facts on how every body of water on earth are in some ways influenced by humans, either through small particles or global processes like climate change. The epistemological relevance relates to the nature of the

hydrosocial cycle as not being able to create abstract waters, but that “it yields practical knowledge of the social-historical nature of water” (Linton, 2010, p. 231). By abstract water, Linton refers to the way water has been understood throughout the twentieth century, which is a creation of a type of modern water that is disconnected and an abstraction from the other processes and contexts of society (Linton, 2010, p. 6). Hydroelectics, on the other hand, emphasize the social relations in which water becomes water, and as a framework of this, the knowledge of flows of water becomes connected to the actual flows of water through social processes. The hydrosocial cycle could thus be a way of conceptualizing the connections between hydrological and social processes (Linton, 2010, p. 231). Water could not be abstracted from the rest of the society, as it can only be understood through its social and political processes and relations.

Because of this, Linton (2010, p. 231) argues that the hydrosocial cycle can be “a means of producing critical knowledge of the social nature of waters”. This makes the hydrosocial cycle relevant for work on political ecology of water, as Linton (2010, p. 232) suggests, and points to how the American Association of Geographers in 2008 and 2009 emphasized the role of the hydrosocial cycle as a framework on research on “the social and political nature of water” (Budds & Linton, 2009, cited in Linton, 2010, p. 233).

Linton (2010, p. 235) presents two ways of applying hydroelectics, namely practically and analytically. The practice of hydroelectics involves “changing waters and the social relations that sustains them, whereas analytical hydroelectics is the study of such relations and changes” (Linton, 2010, p. 235). Simply put, analytical hydroelectics is to apply “a relational-dialectic approach to the study of water and people” (Linton, 2010, p. 241). This involves including how different stakeholders (in terms of water management) and actors has different relations to water, and that in an analytical study, the different waters of the involved are considered. Considering the concept of hydroelectics, then, my thesis could be understood as analytical hydroelectics, as the conceptual and empirical approaches with water and society through the river is a way of producing “knowledge of the social nature of waters” (Linton, 2010, p. 231).

Next, the concepts of the hydrosocial cycle will be further elaborated upon. This will be done through asking the question: What is the urban river?

5.5 What is the urban river?

This section will engage with the concepts of the hydrosocial cycle to create an understanding what the urban river is. This is related to the empirical approach, as these concepts and the

understanding they provide is central to the document analysis. As already mentioned, asking what water is (and in this case the river), is central within the use and understanding of the hydrosocial cycle (Linton & Budds, 2014). By using the hydrological cycle to understand create an understanding of the urban river, this section aims to provide tools of analysis for which the Code river and the socionatural processes connected to the river could be understood.

5.5.1 The river as a hybrid, socionatural flow

To begin this exploration, it is necessary to go back to the relational thinking that was presented in chapter 2.2.5, and the introduction of the concept of socio-nature in chapter 2.3. Here, socio-nature was introduced as a result of a reconstruction of relational dialectics, in that it included the physical properties of non-human nature in the constructional thinking that was dominating for a long time.

Central within the hydrosocial dialectics is the understanding made by advances in Swyngedouw's (1999; 2004) work, that water and social power are related internally rather than externally (Linton and Budds, 2014, p. 173). This is based on a focus on what constitutes things, rather than a focus on relations between things externally. The properties of something are a result of the function of what constitutes them (Linton & Budds, 2014). Swyngedouw (1999, p. 447) argues that if we understand dialectics as internal relations, as developed by Olman (1993), Balibar (1995), and Harvey (1996), "we must insist on the need to transcend the binary formations of nature and society and develop a new language that maintains the dialectical unity of the process of change as imbodyed in the thing itself". The things Swyngedouw (1999) refer to here, are hybrids. Latour (1993) refers to them as 'quasi-objects', and Haraway (1991) calls them cyborgs. Quasi-objects link the natural and the social and embodies and express both nature and society (Swyngedouw, 1999). Hybrids are thus part of infinite networks that links the local and the global, as well as the human and non-human (Latour, 1993; Swyngedouw, 1999).

Hybrids are part of the process of hybridization, which is central to the idea of the production of socionature, as explained by Swyngedouw (1999). He defines hybridization as "a process of production, of becoming, of perpetual transgression" (Swyngedouw, 1999, p. 447). This builds on Lefebvre's (1991) insistence on the continued process and flux of the production process.

Swyngedouw (1999, p. 449) also notes "how the flow of water, in its material, symbolic, political, and discursive constructions, embodies and expresses exactly how "the production of nature" is both arena for and the outcome of the tumultuous reordering of socionature in

everchanging and intricate manners” (emphasis in original). The process of modernization is central here, and this view of the production of socionatures are central for “understanding the relationship between capitalism, modernity, environment, space, and contemporary life” (Swyngedouw, 1999, p. 449).

The focus on these concepts is not without pitfalls, however. Bakker and Bridge (2006, p. 17) describe how Kirch and Mitchell (2004) criticize the “the emphasis on connection rather than differentiation” within the use of the concept of hybridity and argue that this leads to a weak critical edge in the analysis. Kirch and Mitchell (2004) connects this weakness to the “poverty of the ANT vocabulary”, as noted by Latour (1999, p. 20). This weakness in turns leads to an analysis of “‘motley assemblages’ [and] says very little about how or why such assemblages are put together” (Bakker and Bridge, 2006, p. 17).

However, Bakker and Bridge (2006, p. 17) argue that the approach to hybrids as developed by Swyngedouw avoids this pitfall by focusing on the process of hybridization instead of the hybrid itself. Through this, the origins within historical materialism and Lefebvre (1991) work on production of space and Smith’s (1984) work on the production of nature come to light (Bakker & Bridge, 2006, p. 17). This approach enables a critical edge to the analysis of water resources (Bakker & Bridge, 2006).

So how can we use this to understand the urban river? If understanding the river as a ‘flow of water’, as the wording of which Swyngedouw (1999) uses above, the river embodies the concept of socionature through its physical flow and engagement with the world around it, and through a force in the production process of socionature. Also, Swyngedouw states that the city is a hybrid by envisioning how a cup of water and how it can embody and narrate multiple tales, stories, circulation, and the networks of the city (Latour, 1993; Swyngedouw, 1996, 1999). Placing the river into this then, allows us to see how the river is a hybrid, being both natural and social, while also representing contradictions, tensions and conflicts. The river is a constant flow, that “destroys and creates, combines and separates” (Swyngedouw, 1999, p. 448). By engaging with the concept of hybridity on water, then, one is able to transcend the dualistic view of nature and society by focusing on the socio-natural relations and connects the space through processes of production of socionatures (Swyngedouw, 1999; Linton and Budds, 2014).

The river then, can both be a physical representation of the flow and flux of the hybridization of the city, and the process of producing the socionature of the city. As the water flows through

the city, it engages with the city through the various tales and stories, as Swyngedouw (1999, p. 446) puts it, as it “embodies the multiple tales of socio-nature as hybrid”. This makes the river a good case for studying the socionatures of the city, and to use this as a way of understanding how the city and the river are related, as part of a common socionature of the city. And just as this view involves that “nothing ever is fixed”, the flow of the river cannot “be captured in its entirety as the flows perpetually destroy and create, combine and separate” (Swyngedouw, 1999, pp. 447-448).

It could be argued that it is obvious that in order to understand how the river and the city relates to each other, one must adopt this view of how it all is connected. The river also provides a real-life picture of the actual flow of physical water through the city, but in a way that does not separate it from it. The focus on a particular flow of surface water through a heavily managed river through a million-people city does also involve the focus of materiality in the equation. Materiality is central in the hydrosocial cycle, and this I will be turning to next.

5.5.2 The river as a material flow

The materiality of water is another central element in the hydrosocial cycle. Where the process of hybridization and the production of socio-nature plays a role as defining the hydrosocial cycle as a socio-natural process, the focus on the material of water focus on the “agential role of water in hydrosocial relations” (Linton & Budds, 2014, p. 176). This happens through its properties and capacities as physical water (H₂O) and hydrologic processes, is “agents of social change and organization (Linton & Budds, 2014, p. 176). Flows of water produce rhythms that organize and structure human’s economic and cultural activities (Bear & Bull, 2011). This is connected to relational and dialectical thought within critical geography and political ecology, which in essence “holds that things become what they are in relation to other things that emerge through an overall process of mutual becoming” (Linton, 2010, p. 174; Linton & Budds, 2014).

The concept of materiality is not an easy concept to engage with in writing, as it requires an engagement with metaphysical questions of ontology, agency, and intentionality (Bakker & Bridge, 2006). To focus on materiality is to seek to understand how matter matters, and more specifically, its productive capacities – “what matter does rather than what its essence is” (Anderson and Tolia-Kelly, 2004, p. 672, cited in Bakker & Bridge, 2006, p. 18). Central in the concept of materiality is ‘the material’. Bakker and Bridge (2006, p. 18) explains that the material is

“an acknowledgement that the ‘things’ (commodities, bodies, biophysical processes) that make a difference in the way social relations unfold are not pre-given substrates that variably enable and constrain social action, but are themselves historical products of material, representational and symbolic practices” (emphasis in original).

In this definition, we see the connections to the concepts of hybrids as explained above. The ‘things’ described in the quote are also hybrids, and their influence comes through their matter and how this is part of the process of hybridization. Bakker and Bridge (2006, p. 16) view hybridity as an approach to materiality and focus on how this creates “mongrel materialities”.

The connection between hybrids and material can seem like a paradox, but Bakker and Bridge (2006, p. 16) finds value in applying hybridity’s relational and distributed view of materiality on ‘things’ we tend to view as permanent and stable, and the demonstration of “how the competencies and capacities of ‘things’ are not intrinsic but derive from association”. This can be helpful in studying how resources are not bound to a certain space, and to understand how the attributes and qualities of a resource is produced in tandem with several different materialities (Bakker & Bridge, 2006).

Linton (2010, p. 39) also shows how materiality as materialism has its roots in historical materialism and relational dialectics, and that it comes to light in the conceptualization of metabolism. As mentioned before, metabolism is central in within UPE, together with circulation. Within Marxist thought, metabolism is a representation of the relationship between nature and humans through the labour process (Castree, 2000; Swyngedouw, 1999). It could therefore be said that the focus on the materiality of water is demonstrating the links of the concept of the hydrosocial cycle to the foundational theorizations of nature-human relation that has formed and developed UPE. It is also, as mentioned in chapter 2.2.5, related to Harvey’s (1996, p. 8) use of Whiteheads (1953) ‘permanences’ within dialectical thinking. It has thus been developed as way of anchoring the relational view of dialectical thinking in the permanences of the world, to “say that dialectical argumentation cannot be understood as outside of the concrete material conditions of the world in which we find ourselves” (Harvey, 1996, p. 8).

Bakker (2003b, p. 32) states that materiality is a concept which refers to nature both as an object of analysis through the “acknowledgement of the key role occupied by nature”, and to “an understanding of nature as a subject of political economic processes”. For the former, water is an essential and non-replaceable factor of production processes and urbanization. As for the

latter, water is something that continuously shapes social relations of production, both enabling and constraining its own production (Bakker, 2003b, p. 32).

Bakker (2003b) apply the concept of the materiality of water in her analysis of why water is inherently ‘uncooperative’ when it comes to efforts to commodify and control it. Being a flow resource, water can cover huge distances and areas, and it is not easy to confine within administrative borders. Furthermore, the high density of water makes it a cheap substance to store, but the more expensive to move. It is therefore a localized resource, that fits into what Bakker calls monopolistic control, as opposed to in a commercialized system based on competition (Bakker, 2003b, p. 33).

Continuing with Bakker’s work, she furthermore states that “to engage with the materiality of water, [...] is to begin from the assumption that water is both political and biopolitical”(Bakker, 2012, p. 616). Water is political in the sense that as it moves through the society, it engages with several political aspects as it transgresses borders and jurisdictions, creates differences between regions, neighbourhoods and even people. And, through the modernity’s fixation on bodily hygiene, water availability and distribution, as well as its quality are connected to power and authority. Water is bio-political as it plays a role in the modern society through which governments seek to control and optimize both the water resources available and human’s individual water-use, to ensure continued development and health of the population (Bakker, 2012, p. 619).

Bakker’s (2012) engagement with the materiality of water as political and biopolitical, contributes for understanding how the river engages with political economic structures, and is transformed into resources, and shape the social relations in enabling and constraining manners (Bakker, 2003b, p. 32). This allows for understanding how the river is influencing and is influenced by the technology and infrastructure of the society, as it its flows influences and is influenced by social power and structure.

To focus on the materiality of the river, then, is to focus on the agential role connected to its physical properties and capacities, a view that is central within the hydrosocial cycle. It connects the hydrologic characteristics of the river and allow us a focus on how these are “agents of social change and organization” (Linton & Budds, 2014, p. 176). The material of the river is part of its constitution as a hybrid in the process of hybridization. This involves understanding and looking at the physical properties and the capacities of these, and how it is part of the socio-natural process of the area.

Understanding the river as a material flow also includes then, considering the water quality, the velocity of the flow, the steepness and the incline of the riverbed and the bends have a role in the hydrosocial flow. Moreover, the hydrological factors like rainfall and the seasonal change are also given an agential role, and together with upstream factors it in turn influence the face and capacities of the river. In the case of the Code river, some of the upstream factors include runoff from agriculture and volcanic activity.

Through the river, the materiality of power in the form of energy and force could be connected to its agency (Edgeworth, 2014; Strang, 2014). By looking at the river as a material flow of energy, that shapes and creates through the agency of its forces, we can understand the river as different from other instances of water. The river is characterized by the power of its flow, and its direction, and its relation to human society is in large degree constituted by human interactions with that flow. Flooding is one example that Edgeworth (2014) present as an example of how the “river is a force to be reckoned with”. Flooding could thus be seen as an example of the material powers of the rivers and its agency, created in interaction with human society and human interpretations of natural forces in nature.

Finally, it is worth noting how Bakker and Bridge (2006, p. 21) focus on how an engagement with the materiality in analysis is part of a “situated strategy”. The focus on materialities facilitate a focus on the differences in the material world and provides a grounding of the research in which “we encounter differences that make a difference” (Bakker & Bridge, 2006, p. 21). They present materialities as having “a central role in efforts to ‘de-colonize’ the social sciences”, if ‘colonization’ is understood as Latour’s (1993) ‘modern constitution’ where binaries are “distilled from within a highly differentiated world” (Bakker & Bridge, 2006, p. 21, emphasis in original).

5.5.3 The river as a resource

The last perspective that will be elaborated on here understanding the river as a resource. This is related to the concept of materiality through the focus on material transformations of natural resources into things of value (Bridge, 2009). It is not directly a part of the hydrosocial cycle as presented by Linton and Budds (2014), but in Bakker’s (2002) definition, the circulation of water as a resource is highlighted. Therefore, this section will explore how the river could be understood as a resource within the hydrosocial cycle.

Gavin Bridge (2009, p. 1219) define resources as “a cultural category into which societies place those components of the non-human world that are considered to be useful or valuable in some

way”. In this view then, resources are not just natural things that appear in their natural environments, they are the results of a cultural understanding of utility and value.

Bridge also explores how resources are a dynamic and relational category, as “resources are not: they become” (Zimmerman, 1933, in Bridge, 2009, p. 1220), and that resources are political constructs. A material is not a resource until it is prescribed value, and that value is decided by social and political factors, often decided by actors who has more power than others. The tension that is created between those that has a substance relationship with a resource and those who see the resource as an opportunity for exchange, are therefore central in political ecology work on the commodification of nature (Bridge, 2009, pp. 1221-1222). The emphasis on value is connected therefore to the material and the material qualities of the river, then.

It is interesting to use this idea on water and the river. Water is essential for all living things and is thus a valuable subsistence resource. However, building on Bridge’s (2009) discussion on how resources are also a social category allows for going further into the understanding that what and how a resource have value is relational and can vary over time. When applied to the urban river, it is probable that a lot of different values could be attached to it, as there are many different actors that relate to it. Consequently, the power relations and the tensions between these could be a central part of understanding a particular river as a resource. The river could be valued completely different by different people, depending on their relation to the river.

This perspective on water as a resource that becomes what it is through a prescription of value is not explicitly mentioned by Linton and Budds (2014) in their conceptualization of the hydrosocial cycle. This could be because the focus on the river as a resource in some ways is built on an understanding of nature and society as separate, such as when Bridge (2009, p. 1219) uses the phrasing “components of the non-human world”. However, the idea of water as a resource is nevertheless present through the focus on the materiality of water. Within the hydrosocial cycle, the agential role of water becomes engaged within a particular value system through its identification as a resource (Linton & Budds, 2014), and following this, questions like “whose river is this?” can be asked. This way, water as a resource with a specific value engages with questions of power (Bridge, 2009, p. 1222).

5.6 The hydrosocial cycle in research

How can the hydrosocial cycle be used in research? I think this is an important question to ask at this point. Linton and Budds (2014, p. 177) describe how, through a mobilization of the hydrosocial cycle, “water becomes a means of investigating and analysing social practices and

relations”. It opens up for the opportunity to “identify the assemblage of historical, hydrological, political, and technological circumstances that produce a given instance of “water” as well as to consider what might bring about change in the assemblage” (Linton & Budds, 2014, p. 177, emphasis in original). Central to this then, is that ‘water’ in any given instance is dependent on the social-natural processes by which it was produced. This enables an engagement and analysis of hydrosocial relations from the start when studying a particular instance of water.

How can we use the hydrosocial cycle to study an urban water flow in form of a river? And moreover, how can the hydrosocial cycle be employed to study it through the method of literature review and document analysis? Linton (2010, pp. 241-242) argues how the hydrosocial cycle can be employed to study different readings, views, understandings, and discourses of water, and proposes the analytical hydroelectric for analysing water issues, and how water of a particular circumstance differs among different actors.

Linton and Budds (2014, p. 178) emphasise how the hydrosocial cycle “offers a critical approach that prompts us to consider how water internalizes and reflects social and power relations that might otherwise remain invisible”. This involves

“to question the meaning of water(s) in any given situation. It will entail asking what different waters, knowledges, and meanings are articulated and how these might internalize vested interests and power structures” (Linton & Budds, 2014, p. 178).

The approach of both analytical hydroelectrics and the hydrosocial cycle, is therefore fruitful to use in the effort to understand how *Kali Code* and the kampung relates to each other, or to put it another way, to question the meanings of the waters of *Kali Code*.

One example of using the hydrosocial cycle as an analytical tool, is a study done by Gabrielle Bouleau (2014) regarding the production of science of water and how the waterscapes (in this case the rivers Seine and Rhône in France) shape the science done on these waters. This research shows that river systems are not “a neutral and universal hydrologic endeavor but is shaped by the disciplines and research interests of different scientists” (Linton & Budds, 2014, p. 178). Bouleau (2014) connects the concept of the hydrosocial cycle and waterscapes in a study that shows how there is a cycle of co-producing science of water and the waterscape. This happens through puzzle-solving within an existing paradigm, that leads the way for new categorizations. These categories are engaged in institutionalization and negotiation and are therefore part of “the process of co-production of science and social order” (Bouleau, 2014, pp. 249-250;

Jasanoff, 2004), as new water management systems are based on this institutionalization of research categories. Built within this is the question regarding what water is, and it is therefore related to the understanding of the waterscape and the management of said system.

This research shows how the ontological question of what water is – that is central within the concept of the hydrosocial cycle – are related to the co-production of science, categorizations, and institutionalization within a certain paradigm (Bouleau, 2014). The same process also changes the waterscape and are thus also part of the hydrosocial cycle. This study shows how the research on, and the management of watersheds and river systems also change the waterscape it studies. It demonstrates the relevance of understanding the research done on a waterscape and its effect it has on both the management of its waters.

Understood through this perspective, the hydrosocial cycle is an interesting analytical tool to employ to study the urban river. As water is produced in a socionatural context, a particular waterflow is a direct produce of its internal relations to the social, cultural, political, and economical context. Studying the different perspectives and actors on “a particular instance of water” then, is also a study of the ontological and epistemological understanding of that water (Linton & Budds, 2014, p. 179).

Through this perspective, the river flow is understood both as a physical waterflow through its material, but also as a “socially and discursively mediated thing implicated in that flow” (Bakker, 2002, p. 774; Swyngedouw, 1997). Based on this, one could argue that it is possible to understand and analyse the Code river as a hydrosocial flow of water, and the Code river area as part of that flow. This could be a way of situating the concept of the hydrosocial cycle in the urban waterscape of a smaller urban river, thus enabling an analysis of how an urban river influence and become part of and produce and constitute the urbanization processes in a marginalized or lower-income riverside settlement. As the work engaging with the hydrosocial cycle in UPE is based in the understanding of the political sides of the socio-natural processes, this engagement with the hydrosocial cycle enables an understanding of the urban river as inherently political, enabling an insight into processes of uneven development, social inequality, and capital accumulation in the urbanization process (Linton & Budds, 2014).

UPE of water offers a highly interesting and engaging framework of thinking about water in the city. Building on an understanding of the urbanization of nature, how water becomes part of a transformed nature that fits into a particular urbanization process framed by a diverse socio-economic landscape where power relations are unequal, it is appealing in the sense that it is not

merely normative but “focuses on the realities [of] the decision-making processes that organize socio-ecological transformation” (Swyngedouw & Kaika, 2014, p. 472).

5.7 Summary: the river is...

The point of departure of this chapter was UPE of water, how this framework of thought has developed theory on water’s position in urban theory. The hydrosocial cycle as a reaction to the dualistic ontological and epistemological understanding of water in the hydrologic cycle has been presented (Linton, 2010; Linton & Budds, 2014). Then, the question of what the river is has been engaged with through the hydrosocial cycle. I discussed how the concepts of hybridity and materiality are central within the hydrosocial cycle, and how these might be used to understand the urban river as a socio-natural flow of water. Furthermore, the understanding of water as a resource and the effects it has on the understanding the river has provided another perspective on relations of power within the waterscape. Together, the hydrosocial cycle and the concepts related to it provides ample theoretical tools to understanding the Code river as a socionatural flow of water that are a part of the hybridization processes of urbanization in Yogyakarta. This view enables an understanding of the river as an active force and part of the social and natural processes in the city. This chapter shows the potential of engaging with the hydrosocial cycle and analytical hydroelectics in research. The chapter has provided answers to research question 1b particularly and laid the foundation for the empirical approach of which research question 2b and 2c expresses.

The next chapter will engage with urban water management from the perspective of UPE of water. As already mentioned in this chapter, IWRM has gained traction as a ‘new’ paradigm of urban water management (Gleick, 2000). UPE of water has engaged itself with how this paradigm is built on a dualistic thinking of nature and society, and in the next chapter I will explore these criticisms further. Then I will discuss whether and how work on urban water management within UPE can be relevant for the urban river situated in the urban south.

6 The river in the city: the UPE of urban water management – creating a situated UPE of the river

So far, the focus of this thesis has been on the theoretical discussions of nature-society relations, UPE of water has been presented as a theoretical framework, and the hydrosocial cycle as a conceptual framework for understanding the urban river has been discussed. Before the analysis of the perspectives within the academic texts on the Code River, it is necessary to get an understanding of how research within UPE has studied urban water and what possibilities this provide when studying the urban river, as expressed through research question 1c.

First, UPE literature on urban water will be presented before urban water governance and IWRM will be discussed through the lens of UPE. Lastly, I will explore what implications an engagement with situated UPE as developed by Lawhon et al. (2014) can have on a document analysis of perspectives within academic texts on the Code river.

6.1 UPE literature on urban water

UPE literature on urban water from the 90s until now have in different ways focused on the recent history of urban water management. This include identifying the way the western city became modernized through the formalization and urbanization of water supply. Examples of this is the work by Gandy (2006) on the bacteriological city in the nineteenth century, and Swyngedouw's (1999) work on the Spanish waterscape through the modernization process in the late nineteenth century and early twentieth century. The damming of rivers for the purposes of irrigation became an important tool in the process of modernization of Spain (Swyngedouw, 1999).

UPE literature has also focused on how the development within water management moved from the state-hydraulic paradigm to the state-failure paradigm and market environmentalist paradigm, to the 'sustainable' stage (Bakker, 2003b; Swyngedouw & Kaika, 2014). The research points to how the management of water have been developed and evolved through the dominating understanding of the relation between water as a natural resource and human agency through engineering and technology. This focus is especially apparent in the article by Swyngedouw and Kaika (2014, p. 464). They argue that the urban thought and practice of the 20th century became "de-naturalized" as the belief in engineering and technology surged in the

post-war society. Here we can see similarities with the development of geography as a spatial science around the same time, as explored in chapter 2.

The historical development of water management is also part of the focus of Linton (2010) in his historical account of ‘modern water’. Engaging with several researchers that already has been mentioned here, he demonstrates how the development of the modern, western view of water management that has been dominating the last century, has made ‘modern water’ into an ‘abstraction’. Similar to how Swyngedouw and Kaika (2014, p. 464) argue that urban thought and practice has become “de-naturalized”, Linton (2010) argue that the development of ‘modern water’ management has conceptualized and represented water as an abstracted flow, as “extracted from the social context of human experience and treated as an invariant essence” (Wynn, 2010, p. xi).

The concept of ‘modern water’ is also connected to how the state-hydraulic paradigm is related to the emergence of the hydrologic cycle as developed by Horton (1931) (Linton & Budds, 2014). Here I would argue it is possible to see a correlation between the development within modern water governance and management and the understanding and position of ‘nature’ in relation to society as explored in chapter 2. As virtues of measurement, precise models and generalizable theories came to the fore, ‘nature’ was something humans through the science of engineering and technology could master. The hydrologic cycle and humans’ capability of influencing this through the state, reflect the view on nature as something separate and maybe even subordinate of humans. This is part of the ‘abstraction’ of water that Linton (2010) talks about when talking about ‘modern water’.

The literature of UPE on water governance also reflects its position as a critical urban theory (Keil, 2020). This position is clear in the article by Swyngedouw and Kaika (2014). They criticize the urban sustainability paradigm originating from the 1987 Brundtland Report and the 1992 Rio Summit. They focus on that the term is an “empty signifier” without “neither intellectual coherence nor political substance” (Swyngedouw & Kaika, 2014, p. 467). It has, according to them, become a normative ideal which rests on the ideology of ecological modernization, where techno-scientific eco-management is the answer (Swyngedouw, 2010). This allows, in their view, humanity to continue business-as-usual for a while longer. Consequently, the term ‘sustainability’ has become a fantasy which rests on the “myth of a primordial nature that in its original form is inherently harmonious, balanced and dynamically equilibrated” (Swyngedouw & Kaika, 2014, p. 467).

Could this also be seen as part of the ‘abstraction’ that Linton (2010) is talking about? To cloud the discussions of a more sustainable (for lack of a better word) urban water management with thoughts on technological innovation and ecological modernization. The quote above also reflects the critique that UPE puts on the paradigm of urban sustainability in terms of their view on the relation between nature and society.

UPE literature on urban water has not only focused on the historical development of ‘modern water’ and its implications, as more recent research with Jakarta as a site of study demonstrate. Here, in research by Batubara et al. (2018), Furlong and Kooy (2017), and Kooy et al. (2018), the focus has been especially on groundwater, as Jakarta, as many other coastal cities, are sinking due to a high rate of groundwater extraction along with extensive land conversion on an unstable river delta. These authors focus on how political and social factors influence the access to high-quality groundwater and show how the political factors are engaging with ecological ones.

Flows of water, then, also happens beyond the network, and these flows is mediated by different ecological connections (Furlong & Kooy, 2017). Flows of power is thus not only happening through the piped network, but also in flows of surface and underground water, which intersect in numerous ways. These flows are thus not easily understood and contained by formal governance control (Zwarteveen et al., 2017). The urban water of Jakarta is, then, a bit ‘uncooperative’, referring to Bakker’s (2003b) study of privatization of water supply in England and Wales (Bakker, 2003b).

Another central theme within this research is water governance, and more specifically, the privatization and commercialization of water (Bakker, 2003a; Kooy et al., 2018). Bakker (2003a) argues that the ‘archipelago’ is a metaphor better suited for describing the urban water supply than the ‘network’, which is a biased concept. The public-private dualism is not suitable here, as there’s an overlapping in different strategies in water provision. This is also something Swyngedouw (2004) shows in his study on water in the Ecuadorian city of Guayaquil.

But how are the UPE literature focusing on the river? It is worth noting how there is not much focus on the river beyond the river as a resource through its transformation into dams, as Swyngedouw (1999) and Gandy (2002) does, and for drinking water supply, as explored by Bakker (2003b). The focus remains on the river water as a resource for development of society. Its flow of physical force and material used for irrigation and modernization projects. Taking into consideration the understanding of the river as a resource as explored in chapter 4.3.3, the

writing by Swyngedouw (1999) on the role of water in the modernization of the Spanish society emphasise in a large degree how the river becomes a resource both for nation-building and for irrigation and thus economic purposes.

Other uses of the river in UPE research includes Loftus (2007), which mention the Umgeni River in Durban, South Africa and its role in the production of the socio-natural waterscape through the damming of the river. Hommes and Boelens (2017) focus on rural-urban water transfers in Peru, where the water flows from the Andes to the coast has been transformed by imaginaries and discourses focusing on the virtues of megaprojects where the rural areas become the losing part. This article offers both an example of the state-led paradigm, and the river as parts in major political projects for ensuring drinking water.

A more direct focus on the river which is highly relevant to connect to my project, is the study of the processes of uneven urbanization connected to the narrowing of the Ciliwung River in Jakarta by Batubara et al. (2018). However, as presented in chapter 3.3.2, they place this research under the political ecology of urbanization (PEU), as developed by Angelo and Wachsmuth (2015) in a critique of UPE. Here, they explore how uneven urbanization is cemented through the construction of flood infrastructure like the construction of dikes.

The focus on flows of surface water however, as discussed by Furlong and Kooy (2017) and Zwarteveen et al. (2017), could allow for an understanding of the river as part of the circulation of urban water. This perspective also enables an analysis of how the flows of water intersect in the city, and in different forms. This perspective would enable a view on the river as a political mediated flow which is influenced by different ecological connections between different flows of water (Furlong and Kooy, 2017).

Through these engagements it is possible to see the foundations of UPE as inherited from political ecology, namely, to demonstrate and argue that the apparently apolitical management of water is in fact political, as Robbins (2011) pointed out. The work mentioned above deals in large degree with developing this awareness. It is also possible to identify the focus on the dualistic view of nature and society that the UPE literature see within the 'modern' water paradigm, and that is reflected in the development of geography. The focus on the river in these works have been discussed and demonstrate that there is potential in focusing on the river. In the next part, I will discuss how these perspectives of UPE of water criticize current trends in urban governance of water and the Integrated Water Resource Management (IWRM).

6.2 Integrated Water Resource Management (IWRM) and water governance through the lens of UPE

Drawing from the work done in the 1977 United Nations Water Conference Mar de la Plata, the concept of IWRM was formalized during the 1992 International Conference on Water and Environment in Dublin (1992). IWRM is defined by the Global Water Partnership (GWP) (2020) as “a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems”. As a concept it promotes an integrated approach to the process of managing water, and that rather than a top-down, sector-by-sector approach, one must consider how water is interconnected with other parts of the society, in addition to being vital to local and global ecosystems. IWRM is also highlighted by the United Nations in their 2030 Agenda for Sustainable Development (2015) in their goal 6.5 stating that “by 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate”. IWRM has thus become a central concept for water management, particularly seen in connection to the concept of sustainable development.

Butterworth, Warner, Moriarty, Smits, and Batchelor (2010) note that almost all the definitions of IWRM focus on the economic rationale of improving efficiency in water use, the social or developmental rationale of promoting equity in access to water, and the environmental rationale to achieve sustainability. All these different objectives, the general vagueness and unwieldiness of the concept, and the lack of fit with local and political context, has led to considerable criticism over the past few decades. Butterworth et al. (2010) argue for a ‘lighter’, more locally rooted and pragmatic use of the ideas in IWRM. Central to the argument is the universal principle of the implementations of the reforms, as its seeming to function better for countries which already have the most developed water infrastructure and management capacities (Butterworth et al., 2010). In other words, the concept has a western bias.

The term water governance is connected to IWRM. The OECDs approach to water governance is to consider it as “the political, institutional and administrative framework for Integrated Water Resource Management (IWRM)” (OECD, 2011, p. 19). Zwarteveen et al. (2017, p. 2) summarizes the use of the term governance in water by stating that it “has mostly been used to normatively prescribe or help design particular institutional, organizational, and financial arrangements for making water decisions and regulating water”.

According to Zwartveen et al. (2017), the term governance has been increasing in popularity during the last decades. They identify two reasons for this. The first is the way the term marks a change in emphasis from focus on the infrastructure to the organizational, as one can see by the following statement made by the OECD (2011, p. 17): “the current ‘crisis’ is not a crisis of scarcity, but a crisis of mismanagement, with strong public governance features”. The second reason for its increased usage comes from the change from government to governance, which indicate the diminishing role of the state in the face of delivering public services, with the private sector becoming more involved. New Public Management, ‘good governance’, and the creation of markets is all part of this development (Zwartveen et al., 2017). The authors connect this to the increased awareness within circles of water policy that “water is not just natural, but also highly social” (Zwartveen et al., 2017, p. 2). This is interesting, as it indicates that in an environment highly dominated by engineers and natural scientists, there has been a kind of adoption of the insight of the relation between water and society as developed writings of UPE of water.

In the same opinion piece, the authors aim to strengthen the concept of water governance in UPE so that it can be used to describe and analyse what they call “actual processes of governing water” (Zwartveen et al., 2017, p. 1). Their proposal is an additional and maybe more defined framework of water governance that focus more on what water governance actually is and what it actually results in, instead on what it should be. They argue that equity must in a higher degree be considered when studying water governance, as underlying social, political and economic structures already effects the outcome of water distribution. To understand how this works in practice and how it affects different parts of the society is in their view a central part of water governance.

The term distribution is central within this understanding of water governance. It covers both the physical distribution of water in the landscape, but also how voice and authority on water is distributed (Zwartveen, 2017, p.3). The authors define water governance as “the practices of coordination and decision making between different actors around contested water distributions” (Zwartveen, 2015, p. 18; in Zwartveen et al., 2017, p. 3). Distributions of water and the study of this distribution enables researchers to study how water flows from one area to another, and how this flow affects other places (Zwartveen et al., 2017, p. 5). Here I note the benefit of this understanding of water governance facilitate for an inclusion of the river within the concept of water governance. The inclusion of distribution then in water governance then, makes water governance critical for understanding relations and interdependent

connections to water across space. The focus on contested water distribution could enable an inclusion of the contested and conflicted waters of the river in the concept of water governance.

Another issue within and working with water governance is scale. Norman, Bakker, and Cook (2012) introduces papers that deals with the politics of scale in water governance. They argue that there is space in geography to “continue to refine and redefine our understandings of hydrosocial processes and the politics of scale within water governance” (Norman et al., 2012, p. 53). In studies of water governance, the focus on scalar politics of politics of scale is rewarding in the sense that it can give us a more enhanced understanding of the governance of a flow resource, while also bringing attention to the relationship between power and social networks (Norman et al., 2012). This perspective can be valuable in that it can be used to avoid the pitfall of the territoriality and the focus on traditional city boundaries that’s been expressed through the writings of Angelo and Wachsmuth (2015). Focus on scale can help avoiding this, as it goes beyond the city in its understanding of water as a flow resource.

The writings presented above show how the terms water governance and IWRM can be made relevant for also different kinds of flows of water, in different places than in the global north, and on different scales. These are some conceptual tools for how the perspectives of the academic texts regarding Code river could be understood. In this regard, situated UPE could also provide some tools for understanding the urban river. This will be further presented and discussed below.

6.3 A situated UPE of the urban river

As presented in chapter 4.3.1, situated UPE involves expanding the theoretical scope of UPE to create a more heterogenous field. Developed by Lawhon et al. (2014), it involves including southern contexts as sites for development of theory. In this section, I will discuss how a study of academic texts on the Code river area can be seen as a work in situated UPE, and how this focus on the river can help inform UPE theory towards a more heterogenous field. What implications does the engagement with situated UPE have for the study of the perspectives on the Code river area?

Furlong and Kooy (2017, p. 892) draw on southern urbanism when arguing that writing and research within UPE has come to define the urbanization of water “through its circulation in piped water networks”, when the original definition was much broader. In his 1996 article, which could be seen as a foundational text on the development of an UPE of water, Swyngedouw called to “reconstruct – and hence theorize – the urbanization process as a

political-ecological process with water as the entry point” (1996, p. 76). Therefore, Furlong and Kooy (2017) argue that to be relevant for southern cities, UPE needs to look back to this original definition and broaden the focus (Lawhon et al., 2014). This will enable research that has the capacity to consider the many-faceted realities of cities of the urban south (Furlong & Kooy, 2017).

This perspective can be connected the ‘worlding’ of urban theory, as discussed in chapter 3. Through this perspective, not only the formal infrastructure of potable water originating from the northern cities are seen as the water’s urbanization, but also the variety of processes that are common in southern cities. This view emphasizes the necessity of “going beyond the network for a fuller understanding of water’s urbanization and for the development of meaningful policy responses in turn” (Furlong & Kooy, 2017, p. 889). This focus, in my view, invites the river to be analysed as part of the water distribution in a city, as water outside of the piped network. The engagement with the river as part of the network would thus give an even greater understanding of the complete picture of “water’s urbanization”, as Furlong and Kooy (2017, p. 889) argues for.

The research by Batubara et al. (2018), Furlong and Kooy (2017), and Kooy et al. (2018), as presented in chapter 5.1, is examples of research within situated UPE of water. Jakarta is used as an example of how the majority of water circulation happens outside the piped network. As the access to higher quality groundwater depends on economic capacity and political connections, environmental and social focus must be extended beyond the piped network to improve the urban water services (Kooy et al., 2018).

Although Bakker (2003a) uses the term ‘archipelago’ to describe urban water supply as drinking water, could we expand this to include the river? The archipelago is a metaphor for the overlapping strategies of water provision in the urban south, maybe the river could as one island of water in between the many islands (read: instances) of water in the archipelago which is the waterscape of the city? This perspective could serve to include the river as a part of the water circulation of the city, in addition to establish the water of the river as one of several instances of water that are needed to properly understand the waterscape of the city. The focus of flows of different kinds of water and how these interact by different ecological connections, as Furlong and Kooy (2017) focus on, could in this way have positive implications for the study of the river as part of the political ecologies of urban water.

As I discussed in chapter 6.1, the focus within much research in UPE of water in water governance are on water supply, provision, and distribution, and how these are processes that must be seen within political, social, cultural and economic contexts. It is a stretch to place the river as a flow of water within these themes, other than as parts of the waterscape that is the foundation of the transformation of water into potable water. However, there is potential in the concepts and the perspectives on the water. One of these perspectives that can prove beneficial to the study of the river is everyday practices.

The focus on everyday practices is a part of the situated UPE as developed by Lawhon et al. (2014). The idea here is that the inclusion of people and the everyday city-making, the field of approach within UPE increases. Basing themselves on works on African urbanism, Lawhon et al. (2014) sketches out the possibilities that UPE has in analysing peoples' practices in urban flows, not just infrastructure, which has been the focus of northern UPE. In this case, I think that an engagement with peoples' everyday practices with the river can tell us something about how the water not only flows through and beyond the city, but also through people's lives. People's engagements with the water of the river becomes, then, an aspect of the relation between the river and the life of the people that lives with it. As power is diffuse and relational in this aspect, understanding the river through peoples' everyday practices enables an understanding of how this gives them power in different forms, and vice versa, how the river, through its engagement with the people, also has power.

The focus on everyday practices is part of situated UPE's overall mission to increase UPE's ability to create actual change, not just point at aspects of society that need change (Lawhon et al., 2014). The aspect of everyday practices is taking into consideration the individual and unique realities and actions and understand this as its epistemological foundation. The focus on everyday practices of the people in the Code river area, then, becomes part of strengthening the call of UPE as a critical urban theory to induce actual change.

Taking into consideration both the focus of flows of water outside the formalized networked as discussed above, and the focus of everyday practices in relation to the river, then, creates both theoretical and empirical possibilities in the study of the urban river. This perspective would strengthen the Code river as a site of theorization, as the everyday practices and the particular hydrosocial flows of water is part of the political-ecological processes of the area. This way, the Code river area have the potential to inform the UPE of water as a site of theorization from the urban south.

Going back to the original definition of the urbanization of water UPE as presented by Swyngedouw (1996) in the start of the section, the engagement with situated UPE on the urban river, can in a higher degree consider water in many different forms as part of the urbanization of water. The study of the urban river then, has the implications of making UPE more relevant for the whole city, and a variety of cities. The engagement with other types of water connects UPE with wider processes of urbanization of water. The project then becomes part of the worlding of theory and the heterogenous development of UPE.

6.4 Summary

In this chapter I have engaged with UPE literature concerning urban water and seen that the focus in large degree have remained on historical development of what Linton (2010) calls ‘modern water’, and critiques of IWRM and water governance. Here UPE, and particularly situated UPE offers new perspectives and concepts which provide both theoretical and empirical possibilities in the study of the urban river. As the next chapter will introduce and present the Code river area as the physical location of which the academic texts that constitute the empirical approach is concerned, these insights are relevant for the upcoming document analysis.

7 Situating the study of the Code river area

As mentioned in the introduction, this thesis is based on a desktop study constituted by two approaches: a conceptual approach and an empirical approach. While the conceptual approach has been the focus in the previous chapters, this chapter will present the physical location of which the empirical research documents analysed in chapter 8 is concerned. As the empirical approach of the thesis is to analyse the perspectives identified within academic texts concerning the Code river area, embedding this literature within the physical location of which the studies are concerned, is central for understanding the empirical context of the research and the texts themselves.

The chapter consists of four sections. The first section briefly presents the physical study area of which the academic texts are concerned and explains the areal limitations, the wording, and the concepts and terms used and the rationalities behind the limitation of the study area. The second and third sections will explore the topological and ecological context of the study area, and present Yogyakarta city and the Code river. Finally, the fourth section will focus on the settlements along the river, where I will pay additional attention to understanding the riverside settlements as a *kampung* with historical ties to the urbanization of Indonesian cities and Yogyakarta.

7.1 Establishing the study area

The empirical orientation of this thesis is connected to the river Code in Yogyakarta, Indonesia. Also called *Kali Code*, *Code* is the name of the river, while *Kali* means river in Javansese language. Although some sources in English use the phrase Kali Code (Seftyono, 2010, 2012; Seftyono & Noviyanti, 2016), I will use the wording “the Code river” in different variants when I talk about the river, and “the Code river area” when referring to the river area as a whole, including both the river, the riverbank, and the adjacent urban settlements.

These areas are also how I limit the physical context of the academic literature on what I call “the Code river area”. This includes the river and the adjacent urban settlements on the riverside. These limitations are connected to the aim of the thesis, of exploring how the nature-society relations of the city can be understood through the study of the urban river. Although it could be argued that the area could be expanded to Yogyakarta as a whole and including more

of the rivers, these limits are set to enable a concrete enough analysis and to set clear parameters for the collection of texts.

In addition to presenting the physical and empirical context of the academic literature on the Code river transversally across the river from side to side, the area is also limited upstream and downstream. As the study is focused on the urban areas of the Kali Code area, the part of the river that is located inside the district of Yogyakarta city is part of the study, thus excluding the upstream and downstream stretches of the river in the neighbouring districts of Sleman and Bantul. This area can be seen in figure 3. As this is a fairly big area, it is worth noting that the limits of the case study area are not set in stone but are more approximate considerations regarding the general focus of the studies chosen.

Based on these limits, the physical context of the study area of which the academic texts on the Code river area are concerned, is therefore the upstream and downstream parts of Code river, the topological and ecological conditions of the region and the city of Yogyakarta. These are the areas that will be accounted for in the next section.

7.2 The topological and ecological context of the Code river area

The ability to properly understand the physical context of the area of which the academic texts on the Code river area is concerned, is crucial for enabling a sound analysis of the perspectives within the text (Yin, 2003, p. 13). Therefore, central to this study is to place and, consequently, understand the Code river area within and in relation to its physical and topological context. This section will therefore account for the landscape of the Yogyakarta Special Region (DIY), and the ecological and topological conditions of the area. Central to this is understanding the waterscape, and the hydrological conditions will therefore be given extra attention.

The city of Yogyakarta is the capital of the Special Region of Yogyakarta (*Daerah Istimewa Yogyakarta*, DIY), a region that borders the southern coastline of the island of Java (see figure 2). Situated just south of the equator, the island has a tropical climate, with little change in mean temperatures. Throughout the year there is a rainy period and a dryer period, and the weather is humid and hot all year, the average temperatures ranging from around 20 to 30 degrees Celsius (Susanto, Zheng, Liu, & Wang, 2020; World Weather Online, 2021). During the rainy season, October till June, the monthly precipitation rates are around 200 mm, while from May till approximately October, the precipitation rates and temperature are considerably lower (World Weather Online, 2021).



Figure 2: Screenshot from Google earth of the island Java in Indonesia. DIY is situated at the centre of the southern coastline. Source: Google earth (n.d.-a).

Indonesia is located at the junction of four tectonic plates, resulting in high volcanic activity in the region. The volcanic belt on Java makes the region prone natural hazards like to earthquakes, floods, forest fires, and landslides, among others (BNPB, n.d.). Mount Merapi is the most active volcano on Java and is located just to the north of DIY, and only 30 km north of the city of Yogyakarta. The volcano has a height of nearly 3000 meters and erupts regularly. The last eruption took place August 8, 2021 (Al Jazeera, 2021).

The volcanoes of Java have influenced the topological and ecological conditions of the region a great deal. Despite being in a tropical climate zone, the volcanic activity has led to a soil that has been periodically enriched by volcanic ash, making the soil of DIY much more fertile than what is usually the case in tropical areas ("Java," 2021). This enables an extensive agricultural production, with up to several harvests a year (Setiawan, 1998, p. 126). The main agricultural product is rice, but they also grow maize, soybean, and other crops, providing produce for their own population and other parts of Indonesia (Whitten, Soeriaatmadja, & Afiff, 1996, p. 41).

From the lower parts of the southern slopes of Mount Merapi, the landscape flattens out towards the city of Yogyakarta on an average elevation of 114 m above sea level and continues south towards the Indian ocean (BPS Kota Yogyakarta, 2019). There are several smaller rivers draining in this direction, and as the island is quite long and narrow, the rivers on the island are usually less than 50 km long (Whitten et al., 1996, p. 49). Although they are of not great length or width, the rivers serve an important purpose in the region nonetheless. With Java being the “rice bowl” of Indonesia, water plays a vital role in this production (Whitten et al., 1996, p.

566). The rivers serve as water supply for the rice fields, as irrigation systems distribute the water to the different rice fields (Whitten et al., 1996, p. 566). The continuous flow of water allows for a cultivation of up to three rice crops a year (Setiawan, 1998, p. 126). The management of water resources by the means of dams and reservoirs are therefore not a foreign practice in Java. As of 1994 there were nine weirs along the river Code, serving 988 hectares of agricultural land (PPLH-UGM, 1994, cited in Setiawan, 1998, p. 126).

Seasonal flooding is not an uncommon issue in Java, and as a result, many rivers are managed so that as to avoid the unpredictable changes in the water flow (Whitten et al., 1996, p. 416). The main issue of the rivers in Java according to Whitten et al. (1996) is pollution and flooding. Often the flooding also is worsened by the sedimentation on the riverbed and the urban waste blocking the waterways, leading to the need of excavating and “flush the river clean” by releasing water from upstream dams (Whitten et al., 1996, p. 51).

Three of the rivers flowing southwards from Mount Merapi are *Winongo*, *Code*, and *Gajahwong*. They cross the city of Yogyakarta in the western part, the central part, and the eastern part of the city respectively, before continuing south towards the Indian ocean (BPS Kota Yogyakarta, 2019). Next, I will introduce the Code river and Yogyakarta city.

7.3 Introducing the Code river and the city

The Code river is one of the three major rivers flowing through the city of Yogyakarta north to south, beginning from its spring by the foot of Mount Merapi (see figure 3). It is a relatively small river, as its width varies between 15 meters in the upstream parts and 30 meters in the downstream parts (Setiawan, 1998, p. 126). The river has a total length of around 60 km, passing north to south through the districts of Sleman, Yogyakarta City, and Bantul, before reaching the Indian ocean (Idham, 2018).

The city of Yogyakarta and the Code river has a close history. The flow of the river from Mount Merapi to the ocean follows what Ford (1993, pp. 377-378) calls “the cosmic spine that connects Gunung Agung, a sacred mountain north of the city, to the ocean on the south”. Through its flow towards the ocean, the river passes close by what could be considered as the *alun-alun* of Yogyakarta, and the *kraton* (palace) (see figure 3). The term *alun-alun* is defined by Setiawan (1998, p. ix) as “square at front or rear of palace”, while Ford (1993, p. 378) define it in relation to the palace and “its associated large open square”. The commercial sector of the city extends along this line, in a fashion which Ford (1993, p. 378) find similar to coastal Indonesian cities. The linear structure of the city, along the path of Code, is according to Ford

(1993, p. 377) a result of religious ideology. This makes, according to him, Yogyakartas structure different from cities like Semarang and Jakarta, of which the linear line of the city goes from the port to higher grounds where the drinking water was less saline (Ford, 1993, p. 377).

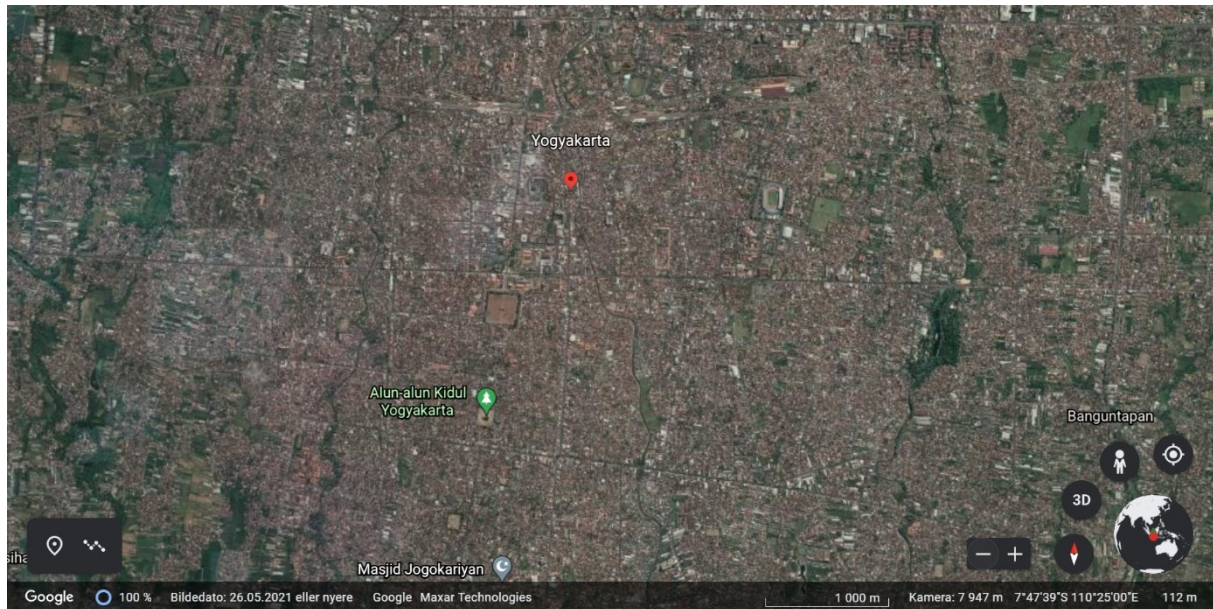


Figure 3: Screenshot from Google earth of Yogyakarta city. Code river area is seen as a tiny line in the middle, running south-southeast to the east of the red marker. Source: Google earth (n.d.-b).

The cosmic spine which Ford (1993) mentions, could be connected to how water has a cultural and religious meaning and purpose in Java and in Yogyakarta (Yusuf & Purwandani, 2020). This has its origin in Javanese culture, where water symbolize the connection between nature, God, and the environment. Water is also an important aspect of community, where it symbolizes the purification of the community. Therefore, the source of water is seen as a sacred place, the source being both the spring and the river (Yusuf & Purwandani, 2020).

The *kraton* is a site of historical and political importance for Yogyakarta, as the building of the sultanate palace, the *kraton*, between the rivers Winongo and Code in 1756 is recognized as the time establishment of the city as capital of the Yogyakarta Special Region (*Daerah Istimewa Yogyakarta*, DIY) (Setiawan, 1998, pp. 86-87). Although it is considered a young city, Yogyakarta came to be the centre of Javanese culture during the 19th century. Setiawan (1998, p. 93) describes how the city played a special role in the establishing in the Republic of Indonesia as it was the capital of the republic from 1946 to 1949 during the war of independence.

Being an inland city, the economy has been different from coastal cities as Jakarta or Surabaya, Setiawan (1998, p. 100) points out. Rather than being based mainly on trade, it has historically been a centre of agriculture, and lately it has also been an administrative and political centre. This has changed somewhat since the 1990s, when the tourist and the educational sector expanded. The city is therefore a major centre of higher education, with over 30 universities. According to Hampton (2003), the estimated student population was around 200 000 in 2003, a number which probably has increased fairly much the last couple of decades.

This development is reflected in the demographic characteristics of the city, which Setiawan (1998, p. 104-107) presents. He notes how the city is a melting pot of different nationalities and ethnicities, and including the many students residing in the city, coming from all over Indonesia and abroad to study. The current population rate of the inner-city of Yogyakarta is estimated at 439,829, while the province DIY in 2010 had a population of around 3.5 million (BPS, 2020; World Population Review, n.d.). The urban agglomeration areas of Yogyakarta stretches outside of its municipal boundaries and into neighbouring districts of Bantul and Sleman (Fathmawati, Fachiroh, Sutomo, & Putra, 2018).

Code runs through some of the most densely populated districts of Yogyakarta (BPS Kota Yogyakarta, 2021). In many cases it creates the border of the sub-districts, while passing straight through others. In total it passes through or by the border of 7 sub-districts when including only those within the limits of Yogyakarta city (OpenStreetMap contributors, n.d.). Within these sub-districts there are several other smaller districts, that is divided into areas given the denominator RW (*Rukun Warga* (community unit)) and a number. This is the lowest administrative level in the city, and the system was introduced by the Japanese during its short period of occupation during the second world war (Setiawan, 1998, p. 93). Several of these smallest districts, are located right by the water's edge along the rivers of the city (OpenStreetMap contributors, n.d.). The picture of figure 4 give some idea of how parts of the Code river area looks, but is not representative for the whole area.

The settlements along the river face some risk because of its location. The rivers that run through Yogyakarta not only transport water, they also has a function of transporting volcanic materials like stones, ash and sands from Mount Merapi (Idham, 2018; Seftyono, 2010). This way, the size and aspect of Code vary in relation with the activities of Mount Merapi. When the region experiences heavy rains or there is an eruption, this is reflected in the river, as it did in November 2010. Following an eruption, heavy rains caused a lahar flood which reached up to

1.5 meters some places, and in the process inundated over 300 houses (Heryanti & Kingma, 2012). The high amount of volcanic materials also leads to sedimentation, further increasing the risk of flooding, and makes the municipality having to continuously excavate the riverbed (Idham, 2018).



Figure 4: Picture taken along the Code river May 3rd, 2019. Source: Nurshafira, T.

In the next section, I will focus on the settlements adjacent to the river and seek to create an understanding of them as urban settlements through their description as *kampung*.

7.4 Understanding the *kampung*

As the aim of this thesis is to explore how the nature-society relations of the city can be understood through the study of the urban river, the urban settlements close to the river called *kampung* needs to be explained and understood through its historical and socio-political context. This is important for understanding the Code river area and enabling an analysis of the perspectives within research on the area. This section will therefore focus on understanding these settlements as *kampungs*, or “informal settlements in form of *kampung*” (Setiawan, 1998, p. 2).

Setiawan (1998, p. 2) briefly present *kampung* (without the plural indicating -s, as is common in the Indonesian language) as “typical informal settlements in urban areas in Indonesia”. However, the extensive use of the word *kampung* in both the contextual literature and the

empirical literature analysed later, leads to the need to properly understand the kampung. Why not call it simply “urban settlement” or “informal settlement”? What makes the different from other types of urban settlements or neighbourhoods in Yogyakarta, informal or not?

7.4.1 The definitions of the kampung and the problems with them

The kampung is a difficult term to employ in discussion, partly due to the fact that it does not have an English translation of the word or definition of the term itself (Ford, 1993, p. 392). According to Setiawan (1998, p. 59), there are two meanings and interpretations of the word kampung. Outside of Java, the word refers to a ‘village’ or other rural settlements. In Java however, the word for ‘village’ is *desa*, and the word *kampung* here instead refers to “a residential area within a city”.

Ford (1993, p. 392) define kampung as “a mostly unplanned, primarily low-income residential area that has gradually been built and serviced”. Idham (2018, p. 178) on the other hand, states that “Kampung in Indonesian cities is a residential part which is self-developed by the people to resolve their problems”. A more recent definition found is one employed by Kusno (2020), which denotes kampung as “irregular settlements”. In an article by the same author in 2015, the phrase “poor urban neighbourhood” is used to explain the word *kampung*.

Cited in Watson (1994, p. 1002), Sullivan (1992) refers to the kampung as “those small densely packed residential areas of the urban poor located in the centres of cities which seem consciously designed to reproduce those *gemeinschaftlich* qualities of closeness and mutual support that one associates with the ‘traditional’ village” (emphasis in original). Ford (1993, p. 391), on the other hand, refer to the kampung explicitly as a contrast to the “formal zones” of the Indonesian city. He argues that this contrast is an “essential component of any model of Indonesian urbanism” (p. 291). In Ford’s model of Indonesian city structure, the kampung is what is left “after discussion of all foreign, planned, elite, and industrial sections of the city” (Ford, 1993, p. 392). This opens up for a great variety of types of kampung, which will be discussed later.

To sum up, there seems to be many different understandings of what kampung is, both regarding its relation to the urban, and in relation to the people that lives there. Some of these are summarised and problematized by Setiawan (1998). The first problem he addresses is that many definitions focus on only the negative aspects of the kampung. Setiawan uses a Dutch scholar’s description as an example of this. “The poor quarters (of Indonesian cities) look village-like, with their unpaved lanes, narrow alleys, and thatched huts, hidden behind foliage in the coils of

some slowly flowing dirty river” (Wertheim, 1958, p. 168, cited in Setiawan, 1998, p. 62). Worth noting is the mention of river in this definition. Here, the kampung is described in relation to a river, and here the river is part of what makes the kampung what it is (or at least part of what Wertheim view it as).

The second problem Setiawan (1998, pp. 62-63) identifies is that the definitions tend to focus on only one type of kampung, and particularly the most deprived ones in the inner-city centres. These definitions have, in Setiawan’s opinion, created a biased interpretation of the kampung. In reality, according to him, most kampung are lively and healthy environments.

Another problem with the definitions and descriptions of kampung that Setiawan discusses is the dichotomy of which the kampung are seen through. Understanding the kampung through an urban-rural, formal-informal, traditional-modern, lens, will always lead to the kampung being seen in a more negative light (Setiawan, 1998, pp. 62-63). Rather, drawing on Atman (1975, pp. 216-220, in Setiawan, 1998), he argues that the kampung should be seen in relation to the rural-urban continuum. This relates to the complexities and the dynamic of the kampung, that should not be reduced to a black-and-white picture.

Lastly, Setiawan (1998, pp. 64-65) points out how the kampung mostly has been understood as static entities, rather than the dynamic entities they are. The kampung will always adapt or try to adapt to their surroundings, something that could be part of the explanation of the variation of the different kampung.

Based on this discussion, Setiawan (1998, p. 65) proposes the following definition in his dissertation:

“Kampung as physical phenomena refers to various forms of urban settlements, (ranging from new squatters to old-establishment settlements), with various levels of physical quality (from very poor settlements to better quality settlements), located in various parts of an urban environment (from the centre to the periphery, occupied by various socio-economic groups of people (although mostly the poor), and always changing dynamically”.

Although a mouthful, Setiawan argues that this definition is important, as it “accommodates a more fundamental issue concerning kampung as socio-political units, as urban communities” (Setiawan, 1998, p. 65). It also suits his suggestion that a definition of the kampung needs to be “more neutral, but comprehensive” (Setiawan, 1998, p. 65). These are valid points, and

although this definition is too comprehensive for this thesis, it nevertheless reflects what Setiawan wants to convey, that the kampung is a dynamic and complex type of urban settlements, which is highly connected to the community of the particular kampung.

Based on the points by Setiawan, and the definitions discussed, I will in this thesis understand the kampung as an urban neighbourhood which is distinguished from other parts of the city through its notions of community, traditions, populated by mostly common people from a variety of backgrounds. I think it is useful to think of the kampung as something that becomes a kampung through a particular historical and social development, a development which is related to the city. This will be focused upon next.

7.4.2 Understanding the kampungs of Yogyakarta

After having discussed the different definitions of the kampung, it is time to focus on the kampungs of Yogyakarta particularly. Ford (1993) discuss the kampungs role in Indonesian city structure in general and demonstrate that there are major differences of the kampungs between cities and within cities.

Setiawan (1998, pp. 65-68) argue that the kampung must be seen in the context of the historical relations between the community and the state in Indonesian society in general, and Javanese culture in particular. This allows us to understand the kampung as dynamic socio-political units which involves themselves in the urban development of the city. Also, through the focus on community, Setiawan (1998, pp. 72-74) show how the kampung is a unit of social action, organized groups of people that work together. In this way, 'kampung' is not only a noun, but also a verb which "refers to a process of ongoing participation" (Setiawan, 1998, p. 74). This is related to understanding the kampung as a dynamic entity.

Setiawan (1998, p. 20) draws the connection from the urban growth Yogyakarta has experienced for some time to the creation and transformation of the urban kampung in the city centre. The kampung was also already a part of the urban structure at the time of the foundation of the city by the sultan Hamengku Buwono I in 1755 (Setiawan, 1998, p. 88). The kampung was here seen as something both outside the *kraton*, and therefore not something to be bothering about, as the urban population did not pay taxes to the sultanate and therefore was no economic source (Sullivan, 1992, in Setiawan, 1998, p. 89). The city was further influenced by the Dutch through the colonial period, and as a westernization of the city was happening, this was done on the expense of the kampung, pushing the native Javanese population to even more concentrated kampung land (Houben, 1994, in Setiawan, 1998, p. 90). The present-day city was

established in the pattern from this time, the *kraton* and the Dutch quarters as main elements, with the surrounding *kampung*.

Houben (1994, in Setiawan, 1998, p. 90) points out how the position of the *kampung* in relation to the Dutch quarters show how the Javanese population stood in relation to the European minority and their interests. It is almost as one can see how the city of Yogyakarta has been formed through the Eurocentric view of the colonizers, and that this division came to light also in the structure and architecture of the city. Also, as the city grew to attract youths from around the country to study in the city, in the lack of a housing plan, the new population were all housed in the *kampung* (Setiawan, 1998, p. 92). This resonates with what Ford (1993) writes about in his article, where he notes how the *kampung* can be seen in contrast to the formal zones.

It is clear, then, that the *kampungs* vary a great deal among themselves. As this thesis concerns itself with a particular area along the Code river, it is worth looking closer to the different types of *kampung* that are identified and what constitutes the type of *kampung* that will be the focus of this thesis.

Ford (1993) identifies four different types of *kampung* in Indonesian cities. These are the inner city-*kampung*, the midcity-*kampung*, the rural *kampung*, and the squatter *kampung*. These are consistent with his city model and are thus quite general. Setiawan (1998) on the other side, presents a comprehensive discussion of the development of the different types of *kampungs* in Yogyakarta. According to him, the *kampungs* were originally scattered around the *kraton*, with each *kampung* designated for particular groups or professions. However, as Yogyakarta grew, so did also the *kraton's* influence over the *kampung* change, and as of around 1830, the *kampung* was quarters for the urban population in general (Kasto, 1976; Sullivan, 1992).

The history connected to the *kraton* and the Sultanate is relevant to understanding the *kampungs* of Yogyakarta as this influence the status of the land. Wicaksono (2020) explains that in Yogyakarta, there are two types of land, namely “Crown Domain” and “Sultan’s Ground”. Importantly to note in this case, is that “most of the riverside areas in Yogyakarta are considered Sultan’s Ground” (Wicaksono, 2020, p. 3). This has the implications that most of the inhabitants at the riversides did not own the land themselves, but that they are permitted to live there by the Sultan. As the analysis in chapter 8 will show, this situation has changed somewhat.

As the *kampung* not only appear around the *kraton*, but also in the outskirts of the city and other places, Setiawan (1998, pp. 99-100) identifies four types of *kampung*. The first one is the traditional one close to the *kraton* and is already mentioned. The second type of *kampung* is

what he calls 'riverbank kampung', which are located along the rivers of the city. The riverbank kampung is both old and new, and often attracts controversy as issues of legality and informality are raised. The third type is the 'urban fringe kampung', which were rural settlements included in the city, while the fourth type is the 'squatter kampung', which have been established by settling on vacant land around the city. This type of kampung can be found on the riverflat as well.

This thesis will engage with the riverside kampung in the analysis of research concerning the Code river area. The squatter kampung could be relevant as well, but as the kampungs along the central Code river are quite permanent, the squatter kampung are not that relevant to use in this case. However, knowledge of it is relevant as the origin of many of the kampungs along the river stems from previous squatter kampungs that has become permanent (Setiawan, 1998). Worth noting though, is that several of the riverside kampung of the Code river are close to the kraton, which could make it both a traditional kampung, and a riverside kampung.

Like for rest of Yogyakarta, tourism has also been important for the development of the kampung. Hampton's (2003) study of the Sosrowijayan kampung shows how tourist, and especially the subcategory backpackers, has been important the kampung. It enabled a bottom-up transformation of the kampung, from 'a slum' to an 'international kampung' (Hampton, 2003, p. 98). The low-cost accommodation and the central localisation were important factors that enabled this growth. The Sosrowijayan kampung is situated in between the rivers Code and the Winongo and is therefore not a river kampung.

A riverside kampung that has developed as a tourist attraction, is the Gondolayu kampung, which with its coloured houses and elaborate architecture gets the attention from the tourists (Setiawan, 1998, p. 168). This area was, until the 1970s, a socially marginalized and 'unhealthy' area, and subject to the government's efforts to remove it. However, in the 1980s, the architect, priest, and social worker Romo Mangunwijaya (commonly called Romo Mangun) came to live and work in the area, and having the support of the local residents, designed and constructed a completely new kampung. In addition to greatly improving the housing situation for the kampung people, his work was also focused on empowerment through a variety of social programs (Setiawan, 1998, p. 163-166). His involvement was also crucial for opposing the plan of the local government to demolish houses due to its bad environmental state (Kumorotomo, Darwin, & Faturochman, 1995).

Architecturally, this kampung is great achievement. Following the steep topography of the riverside, the houses are built on embankments, retaining walls or concrete footings, some above the storm drain. The structures themselves are built to provide additional support and to allow the space to be naturally ventilated (Lian, 2011; B. Setiawan, 1998, p. 165).

Romo Mangun is also given credit by some for the building of a dike along the riverside, in the form of a retaining wall (Idham, 2018; Setiawan, 2002). Setiawan (2002) relate the initiation of the project to a flood in 1984, where over 300 houses were affected directly. Because of this, the government proposed plans for a relocation of the kampung to the outskirts of the city, and the construction of new, high-rise apartment buildings in its place. This, of course, created controversies. Although the idea of constructing a riverside dike was not new, Setiawan (2002) argue that the involvement of Romo Mangun gave the community the confidence to proposing the project for the government. The result, according to him, was that the construction of the riverside dike was realised in cooperation between the local government and the local communities in the kampung. The riverside dike will be further discussed and analysed in chapter 8.

So, based on this engagement with writings on the kampung, how can the kampung be understood in this thesis? Based on the discussion regarding the definitions and the critique raised by Setiawan (1998) and the historical and socio-political situation of the kampung explored above, I understand the kampung as an urban settlement which has been formed throughout the history of Yogyakarta, and whose history and development are both connected to rural and urban developmental processes. I also see the influence of socio-political structures of the society as central for both the understanding of what it is, and what it has become.

I think that the perspective emphasised by Setiawan (1998) to not to understand it as a dichotomy but as a relative and continually shifting neighbourhood shaped by the people living there is valuable in this sense. The kampung as a unique community is therefore also an important part of how I understand the kampung. Finally, the understanding of the kampung as something outside the formal city that has developed through other mechanisms are also central here. Setiawan's (1998) discussion on how the kampungs have developed, demonstrates the emphasis of the kampung as a social unit is crucial for acknowledging how the social and political forces of the kampung are unique, and that issues of legality and marginality are connected to the history of the settlements.

These understandings of the kampung makes it an interesting case of studying the urban river as part of the urbanization of nature. The informal style of the structures, a development that has happened outside the formal urban city structure, and the feelings and actions of community, provide opportunities to see how the water flows through the individual lives and the community as a whole. It provides a way of understanding how the water and the society along the river plays a role and influences the hydrosocial waterscape of the area.

Furthermore, studying the Code river and the kampung based on these understandings, is also a way of engaging with situated UPE, as it emphasise the importance of the community and the inhabitants as central in the understanding of the area. In terms of river management and governance, this engages with notions and understanding of power (Lawhon et al., 2014). It also establishes the hydrosocial neighbourhood in a southern city as a site of theoretical analysis, something that I would argue contributes to a more heterogenous UPE of water that Lawhon et al. (2014) are advocating for. This will be further explored in chapter 8.

7.5 Summary

In this chapter, I have introduced the study area of which the documents analysed in chapter 8 is concerned with, including the region and city of Yogyakarta to understand the historical and physical and empirical context of these texts. Also, effort has gone into understanding the urban riverside settlement of Yogyakarta as kampungs, with the history, urban development and characteristics that involves. In the next chapter, perspectives within academic research on the Code river area will be analysed and discussed through the engagement with UPE of water and its related concepts.

8 Perspectives on the Code river area: a document analysis of empirical research

This chapter constitutes the empirical approach of the thesis and engages with the research questions 2a, 2b, and 2c. Based on a document analysis of empirical research on the Code river area and through a thematic analysis, I have identified eight prevalent perspectives within research on the Code river area. The different perspectives will be discussed through the employment of the concepts of UPE of water and the work done in the conceptual approach, as part of exploring how nature-society relations can be understood through the study of the urban river.

As I discussed in chapter 4.6, the hydrosocial cycle can be used as an analytical tool to understand the urban river, as Linton (2010, pp. 241-242) argue that the hydrosocial cycle can be employed to study different readings, views, understandings and discourses of water. The perspectives identified within the academic documents on the Code river area then, are examples of different views, readings, understandings and discourses that are used to understand the river. Coupled with the engagement with UPE, the identification and discussion of the different perspectives within research on the Code river area is connected to the discussion of the nature-society relations of the area, as the concepts are used to understand the area.

8.1 Exploring perspectives on the Code river area

The Code river area has been the object of study within several research academic fields. As can be seen in the appendix, the research focus of the articles is varied.

The perspectives that have been identified through the thematic analysis are the following:

1. Discursive powers: the 'slum' of Yogyakarta
2. Spatial planning and architecture as community development
3. Risk and vulnerability to natural hazards
4. Local participation in community development and river management
5. Meanings of water: Traditional ecological knowledge and ecosystem services
6. The Code river area as a tourist destination
7. Focus on technology and engineering

8. The sustainability concept in research on the Code river area

The amount of literature identified within the different perspectives varies, and it will become clear that some perspectives are more dominant than others.

8.2 Discursive powers: the ‘slum’ of Yogyakarta

What is reflected in a lot of the writing is the issue of informality and marginality of the settlements in the Code river area. One recurring aspect is that these areas are by many of the authors called the ‘slum’-areas of central Yogyakarta (Idham, 2018; Kumorotomo et al., 1995; Sanjaya & Shiki, 2016; Soemardiono & Gusma, 2014; Wicaksono, 2020). In general, the use of terminology ‘slum’ is a common characteristic in many of the articles. I think that this discursive aspect is interesting to explore further, especially in terms of the discursive power it holds, and as an underlying understanding within many of the articles.

The focus on the physical aspects and the informality of the settlement as an urban river area is connected to the use of the word ‘slum’ on the area. For example, the plans to rearrange and relocate the settlement, which Idham (2018) refers to, is related to the acknowledgement of these areas as slum areas. Bawole and Sutanto (2017, p. 2) also focuses on the kampungs along the Code river as a slum area, characterized by the lack of drainage, problems of clean water supply, and the density of the housing. While Rachmawati and Budiarti (2016) refers to the lack of drainage system and close proximity to the river of the settlements as something that makes them vulnerable to flooding of the river, and thus marginal areas. This is similar to how R. Rachmawati, Prakoso, Sadali, and Yusuf (2017) notes how “riparian is a potential for slums in urban areas”. The river then, plays a role in the identification of the area as a ‘slum’.

Back in 1995, Kumorotomo et al. (1995) wrote about what they call “the slums and squatters in the Yogyakarta town, which are largely located in the river basins”. The peer-reviewed journal article discusses the different slum and squatter improvements programs that has been implemented in the area. They connect the “problems with slum and squatters” to the population increase due to an influx of people from rural areas, and the unavailability of housing (Kumorotomo et al., 1995, p. 34). They refer to a survey conducted by Geocitra Consultant (1985), when presenting that 2% of the residents along the river basin used water from the river for domestic purposes, in addition to being used as public toilet and garbage disposal. The authors further discuss the different improvement programs that have been initiated from higher up the levels of government and conclude with the importance of involvement and participation on part of the communities in the kampungs.

Setiawan's (1998) doctoral dissertation engages with the kampungs of Yogyakarta in several ways. One central issue, however, is the notion of 'marginality' and 'illegality' which, according to him, is part of why the area is often considered a slum. The position of the settlements as far away from the main street, in the marginal area of the riverbank, puts the people that lives in the kampung in the category of "off-street neighbourhoods" where *wong cilik* (the 'little' people) live. This puts the neighbourhood of the kampung in direct opposition to the *wong gede* (the rich or 'big' people) that live by the main roads (Setiawan, 1998, p. 134). This perspective as an understanding of the riverside areas as marginal areas 'outside' of the public domain is interesting, as it connects the different urbanized landscapes of the city to the social and political position of the people living there.

Going through the governments criterion for considering an area as a slum, Setiawan (1998, p. 138) argues against this with arguments connected to the functionality of the housing. He points to the paradox of the areas being considered 'marginal' considering the central position in the city. He also discusses the misunderstandings and misconceptions of the kampung on behalf of the government, originating from the colonialist view of kampung as "native quarter", and how the current city planning was influenced by "'western standards'" in city planning (Setiawan, 1998, pp. 146, 148, emphasis in original). In several ways, Setiawan puts the understanding of the kampung as a marginalized area in relation to social and political perspectives connected to the historical development of Yogyakarta and the Indonesian society in general.

Employing Setiawan's (1998) discussion on the concept 'slum', the research within this perspective then, emphasises the colonial heritage within the city planning and urban development, and demonstrates how it is reflected in the understanding of the kampung. Considering how situated UPE is concerned with provincializing western theory and theoretical view (Chakrabarty, 2007; Lawhon et al., 2014), this perspective could be understood as way of acknowledging southern historical context in urban theory, and how this is reflected in the academic research concerning the area.

Moreover, it is interesting to observe the strong focus on the kampung as a slum, considering the arguments against this narrow understanding discussed in chapter 6.4. Understanding the kampung as a slum focuses on the negative aspects of it and paints a picture of the area as a hopeless place with only poor people. Maybe this also could be seen as a reflection of the western view of the area, as the kampung's connection to the rural and the indigenous attracts stigmatizing and degrading view on the area. Considering the concept of diffuse and enacting

power then (Lawhon et al., 2014), this labelling could be an example of discursive power situated within the academic views and understanding of the area, effectively also shaping the research itself. It is also a way of seeing how the ecological conditions of the riverscape is influencing the perception of the area. Considering environmental and urban imaginaries, this could be understood as an imaginary of the area which could influence the research on it, and the management strategies. This imaginary is connected to the experienced the physical informality and the marginality of the area. This is connected to the spatial planning and architecture of the area, which is the next perspective to be discussed.

8.3 Spatial planning and architecture as community development

The research documents identified within this perspective have in common that they see processes of spatial planning and community development as closely related. This is a major theme within the group of identified studies, as the number of studies presented and discussed here reflect.

Rachmawati et al. (2017) study what they call “riparian planning”, which I understand as spatial planning in the riparian areas of the three rivers in Yogyakarta. Built on a quantitative survey and structured interviews, areas of which can be improved through spatial planning are identified. Here, the river and the riverside play a central role, alongside the involvement of community groups in improving the river area in innovative ways.

Soemardiono and Gusma (2014) study how the spatial planning of the Coder river area can be developed in relation with the ecological functions of the river, with the waterfront as an urban landscape asset. They develop concepts for urban development in five sections along the Code river and relates this to local traditional knowledge. Maybe more than other articles in the section, it includes the river as a physical flow of water with a set of values attached to it and includes the river in the discussion of spatial development of the area. This will be further discussed in chapter 8.5, but here I also see the value of reflecting on how the riverside gets included in the potential they see in the spatial development. They see the river and the riverside as a resource for developing sites of tourism, public spaces, cuisine, and galleries. Considering the understanding of water as a resource as discussed in chapter 4.5.3, it can clearly be seen here that the valuating of the physical environment of the river and the riverside is turning it into a resource for community development. Considered in the hydrosocial cycle, then, this valuation of the material of the riverscape constructs river as a resource. This way it makes it possible to understand the connection between the urban river area as a particular landscape

and how the development of the community as a reflection of this relation between values and community development.

Bawole and Sutanto (2017) also has an environmental aspect, as they explore how the environmental quality in the kampung can be improved through empowerment through 'creativity'. They note that "with all limitations of infrastructure facilities, the poor have to be creative and intelligent in anticipating daily activities carried out on Urban Kampong settlements" (Bawole & Sutanto, 2017, p. 2). They also focus on the spatial pattern of the houses of the kampungs and the architecture, and how this creates communal space. This is important for social interaction and air circulation. The authors also argue that the "special character" of the informal settlements is due to the communities developing "the houses as well as their surrounding environments without planning and the improvement of houses is appropriated with their needs and capabilities", leading to "indigenous architecture" (Bawole & Sutanto, 2017, p. 5). They note how the kampungs along the Code river have potential for improving their area, as other kampungs along other rivers have done in a larger degree.

This document, similar to the documents discussed in the previous section, focus on the practices of the inhabitants in the kampung and how the participation of the people in the kampung can be utilized to implement development strategies. As above, this perspective could then be understood through situated UPE, that the inhabitants enact their power through their everyday practices in the kampung. However, it must be noted how although the authors focus on empowerment through the inhabitants activities in transforming their environment, the article has a top-down approach through the consistent focus on the inhabitants of the kampung as poor and living in a slum, and how they should accept the help of an outsider research group aided by stakeholders with "a heart filled with commitment to help the poor" (Bawole & Sutanto, 2017, p. 6).

Another text which is considering how the spatial planning in the form of architecture of the area has been beneficial for the community, is the journal article by Idham (2018). She studied how the architectural project of Romo Mangun by the Gondulayu Bridge is holding up 25 years after its initiation. Idham describes how the architecture of this project worked as a social remedy for the community and was ground-breaking in several ways. Developed as a response to the government's eradication strategy, this architectural project was focused on creating a communal feeling and common spaces for the inhabitants as a way of increasing the well-being

of the people living there. In the process, a village administration was formed, something that helped to be acknowledged by the government (Krishna, 2014, referred to in Idham, 2018).

Additionally, increasing the inhabitant's awareness for the environment was also part of the project. Idham shows how the houses in the settlement are built with the natural conditions and topography in mind. Ensuring water runoff, air quality, and making them earthquake secure – the buildings “match with nature” (Idham, 2018, p. 184). This she calls “indigenous building design”, and emphasise then the connection between the natural conditions, the indigenous design of local methods that fits the local environment (Idham, 2018, p. 183). The area being on the riverside is therefore incorporated in the architecture of the area, which could be understood through the concept of materiality as explored in chapter 5.5.2.

Idham (2018) also reflects on how the orientation of the houses towards the river changed the way the inhabitants related to their environment and the river. It was no longer in the backyard, hidden away, the river was put at the forefront and is thus being given a central part and position in this urban landscape from the view of the inhabitants.

This particular spatial development is also mentioned by Wicaksono (2020). He connects community development and cooperation to spatial planning and river governance. As the local communities are active in the management in the Code river area, they cooperate with the local government to implement planning projects. He demonstrates how the conservation and proper management of the riverside is central in the M3K movement (*munggah, mundur, madep* – construct upwards, set back, and face the river). This program is also mentioned by Idham (2018) and Setiawan (2002) as central for the spatial and environmental development of the Code riverside the later decades, as it has changed both the spatial structure of the settlements, and the collective attitude towards the river.

This is interesting, as it directly connects spatial planning of the riverside, and the perceptions of the river and how the inhabitants relate to it. Wicaksono (2020) connects the M3K movement to the increase of green area, the increased monitoring of the river, and for security measures. This is also focused upon by Setiawan (2002). He discusses how the riverside dike had the effect that it changed the appearance of the riverside for the better, as pathways, concrete structures, street lighting, expanded green areas can be seen as a direct consequence of the construction of the dike, producing a new space for the communities improve for the better. The reorientation of the houses and the riverside dike is therefore also an example of how the spatial change, where the river is the centre piece, has been central in developing the

community, both in terms of attitudes towards and engagement with, the physical riverscape of the area.

However, not all spatial planning of the riverside has positive consequences, as Idham (2018) reflects upon. She notes that the style of Romo Mangun has not been followed up in other parts of the settlement. In the 25 years that had gone since Romo Mangun executed his project, the population density is five times higher, and many new buildings have been constructed. Idham observes that the newer constructions are constructed with contemporary techniques, and are of a more permanent sort, with materials such as bricks and concrete. Where there 25 years earlier was some green space along the river, new houses along a new retaining wall along the river has led to little space along the riverfront. This, combined with techniques Idham deems “less appropriate for the case”, has eliminated the “green belt as a buffer zone in critical times in case of flood and volcanic overflows” (Idham, 2018, p. 185). What Idham (2018, p. 186) calls “non-stilted” and “non-passable houses” can worsen the effect of the flood, and are also more vulnerable to earthquakes, thus increasing the vulnerability in the area. There are therefore many ways to look at the continuous building and development of the riverbank. Idham (2018, p. 184) demonstrates that she deems the architecture that “match with nature” as better suited for the area. This focus connects spatial planning, ‘green space’ and vulnerability and risk, a connection which is constituted by the river and the riverscape of the area. Considering socio-natural processes then, this interrelatedness can be understood as an expression of the hybridization processes of the area, where the urban space gets continuously created in a dialectical manner. This emphasises how the water is an active agent in the spatial and architectural aspects of the area.

In light of the insights into the situation this perspective of spatial development and architecture as community development provide, it is timely to ask the question of who has power in this development. Is it the inhabitants of the kampung, which through their everyday practices are improving their neighbourhood through an empowerment at the same time? This then, would be an example of how the inhabitants have created change in their own neighbourhood through their everyday practices, which Lawhon et al. (2014) emphasising as a strength of situated UPE. The understanding of power as relational and connected to identity in situated UPE, provides an understanding of the architectural development of the riverbank kampung as strengthening identities, and the process gives them thus more power in light of their engagement in improving their local environment and neighbourhood.

The academic research within this perspective emphasises that proper spatial planning, that involves the local communities, are key to both improving the areas, while at the same time preventing major disasters due to flood. This was also the conclusion of the study by Rachmawati and Budiarti (2016). They argue that the lack of spatial planning of the Code riverside area has been a contributing factor for flood disaster that has occurred there. This shows the connection between spatial planning and how it is related to risk and vulnerability to natural hazards, and disaster risk reduction. This will be focused upon in the next section.

8.4 Risk and vulnerability to natural hazards

A large part of the research done on the Code river area is within the area of risk and vulnerability to natural hazards, as can be seen in the appendix. What this research has in common, is the focus on the threat of flood and inundation as a result thereof, and the issues done to prevent, adapt and lower the level of risk and vulnerability. As mentioned in chapter 6.3, flooding commonly occurs in Code following an eruption of Mount Merapi and/or heavy rainfall. The last major flood occurred November 2010 and continued until the start of 2011. The water reached up to 1.5 meters and inundated around 300 houses (Heryanti, 2012, p. 2; Heryanti & Kingma, 2012; Rachmawati & Budiarti, 2016). There's also a focus on how some of the spatial planning strategies of the riverside areas can be contributing factor for increasing the vulnerability of the area. This happens through the building of the riverside dike that end up narrowing the width of the river, leading to an increased water table at times of flood (Rachmawati & Budiarti, 2016; Toumbourou, 2009).

The physical distance between the water and the houses plays a big part in the article by Rachmawati and Budiarti (2016). Here, the spatial planning of the kampung and the utilization of space, is understood as central in preventing flooding disaster. According to a government regulation from 2011, there must be a distance of 3 meters between the levée and the houses (Rachmawati & Budiarti, 2016). This space also has implications for tourism and the social life of the village. It is not only a preventative measure, but it also improves the riverside area as it allows for more green space, more space for public interaction, easier evacuation in case of flood, and it release space for ecotourism, according to the informants in their study. This is also focused upon by Guinness (2020).

The distance between the river and the houses also plays a role regarding the perception of risk of flooding, as shown through the research done by Heryanti and Kingma (2012). The closer the houses are to the river, the higher the people perceive the flood risk. Another factor that

influenced people's perception of flood risk, was how long they had lived close to the river. Heryanti and Kingma (2012, p. 143) argue that people who has lived there longer had more experience [with flood], and therefore do not perceive flooding as an unusual occurrence, as they are in fact living on a riverbank.

Heryanti's master thesis from 2012 provides an even more detailed look into this situation. The thesis engages with several of the themes identified in this analysis. Based on a lahar flood risk map from 2010, the level of flood risk in the different RWs are identified. Of the total number of 61 RWs, 16 RWs are identified of facing a high risk of lahar flood (Heryanti, 2012, pp. 24-27). Following this identification, Heryanti conducted a fieldwork in 6 RWs, aiming to assess people's perception about flood risk, to identify current coping mechanisms and the local flood hazard management (Heryanti, 2012, p. 4). The findings were that gender, length of stay, the risk level of the RW, and distance between river and house influenced the perception of flood risk. The closer the house was to the river, the higher they perceived the risk (Heryanti, 2012, p. 52).

Interestingly, no socio-economic factors influenced the perception of flood risk, neither did the location within the different zones of flood risk (Heryanti, 2012). When it came to coping mechanisms, Heryanti (2012) identified four types of coping mechanisms: technological, economic, social, and cultural. The type of coping mechanisms related to their perception of risk of flooding. The flood hazard management done by the government consists mainly of structural measures aimed at strengthening the structures aimed at keeping the river at bay, like dams, dikes and the river embankment (Heryanti, 2012). Most of the coping mechanism then, is based on the inhabitants taking their own responsibility in ensuring their own safety (Heryanti, 2012).

The theme of risk management in the Code river area continues in Sulistiyani, Yuliani, and Yuliana (2017) study regarding the responsiveness of Disaster Resilient Villages (DRV's) (*Kampung Tangguh Bencana* in Bahasa Indonesian) in handling flood in Yogyakarta. A DRV "is a village which has an ability to identify hazards in its environments and is able to organize the human resources in reducing the susceptibility as well as increasing the capacity to reduce the disaster risk" (Sulistiyani et al., 2017, p. 94). The article goes through the different levels of Community-based Disaster Risk Reduction (CBDRR) and show how many levels of governance are involved and that have different responsibilities of each unit. The study has a strong focus on equipment, coordination and cooperation between the different levels of

government in regard to Code river. The study emphasizes the kampung's role in the disaster risk management, which seems to be a common theme within the articles identified within this perspective.

Guinness (2020) focus a lot on the riverside dike in his paper. As presented in chapter 7, the building of this can be identified as a turning point for the Code river area, both in terms of spatial planning, protection to natural hazards, and community development (Guinness, 2020). He focuses on how the building of what he calls 'floodwall' had many implications. In terms of risk and vulnerability, it greatly increased the security of the residents, as "the violence of the water was contained within the floodwalls" (Guinness, 2020, p. 429).

Based on the research above, the risk of flooding along the Code river strongly relates to both the physical characteristics of the river, and the spatial characteristics of the kampung. The distance from the river, the dike, the construction of the houses all plays a role when it comes to the threat of flood. This perspective, then, demonstrates the importance of the materiality of not only the river water itself, but the physical structures of the houses, the floodwall, and the physical distance from the river. This it shares with the perspective of architecture and spatial planning. The barriers are also contributing to forming and restricting the actions of the people, by effectively restricting their access to the riverfront, and thus also distancing them from the water. This way, the capacities of the water flow has formed and changed the way humans construct and relate to their local environment. The findings by Heryanti (2012), that the perception of flood risk was lower with increased physical distance to the river, is an example of this.

Together, the articles within this perspective provide examples of how the material conditions of the Code river area, in form of the agential role of the river water in times of flood, and the physical infrastructure of the kampung, produces a specific hydrosocial landscape. In this regard, it could be interesting to discuss if there's possible to draw some connections to the study by Batubara et al. (2017). As presented and discussed in chapters 3.3.2 and 5.3, Batubara et al. (2017) explore how flood infrastructure is parts of processes of uneven urbanization. The situation of the Ciliwung river is strikingly similar to the one of Code river, in terms of measures against flood. This allows me to reflect upon whether the flood structures of the Code river area are part of processes of uneven urbanization. The extensive account of the floodwall done by Guinness (2020) can give some answers to this. Here, he shows that the floodwall had both positive and negative effects for the local community. As the dike allowed for a definite

demarcation of the edges of the river, the inhabitants of the kampung were given the opportunity to be registered as owners of the land. However, the floodwall also restricted access to the river and activities connected to it, in addition to disempower the community leaders through the way it was constructed without the consultation of the community (Guinness, 2020, p. 430). Considering Bakker and Bridge's (2006, p. 21) focus on materialities as a "situated strategy", and a focus on "differences that make a difference", the focus riverside dike, then, allows a focus on how the materiality of the river and the adaptation strategies, produce situated differences. The riverside dike is both a result of the different and unique material conditions of the area, and a construction that produce a that same difference, and materializes the risk.

There's also the previous perspective, where the focus is on how the riverside dike and the walkway along it has changed the inhabitants view of the river, in addition to enabling for green areas and tourism. The riverside dike can therefore be seen as a materialization of the Code river area as a disaster prone area, which both connects the inhabitants closer to the river and increases the distance to the river, in both physical and cognitive ways. This makes the riverside dike a result of socio-political processes connected to other projects of community development and management. This will be further engaged with in the next section.

8.5 Local participation in community development and river management

A considerable amount of the research concerning the Code river area engages with the themes of community development in the Code river area, as seen in previous perspectives. The perspective of local participation in community development and riverside management is strongly related to several of the other perspectives, and especially the perspectives of chapters 8.2 and 8.3. The research presented in this section is mostly centred on the kampung, and the river plays a slightly different role here than in, for example, the risk- and vulnerability perspective. Additionally, this perspective is considering community development in relation to river management in which local participation is emphasised. This is relevant to discuss more in detail, as UPE of water in a high degree discusses and theorizes over issues of governance and management, as reflected upon in chapter 5, and offer critique on the mainstream issues of governance and management. How can this perspective, be understood in light of this?

Here again is Kumorotomo et al. (1995) relevant to consider. They discuss different slum and squatter improvement programs that was created and put in action in Yogyakarta during the 1990s, and focus is on community development from the perspective of these programs. Their

analysis shows how many of these projects are top-down in scale, and that the development of the river basin (the term they use) is connected to processes on national and regional scale.

They highlight the role of community needs and participation in the implementation of the programs. As they write, “Community needs and participation have been the most crucial factors determining the effectiveness of the project implementation” (Kumorotomo et al., 1995, p. 40). Here, the importance of cooperation with a mediating person, the informal leader, is emphasised. Romo Mangun is used as an example. The article concludes with stating that the unsuccessful implementation of the KIP has been due to sporadic or unsustainable nature of program, lack of involvement with local informal leaders and the weakness of efforts to mobilize community participation.

The importance of the local leaders and councils as Kumorotomo et al. (1995) emphasise, reflect the understanding of the kampung as discussed in chapter 6.4. Furthermore, this situation of management of the river as collaboration between instances on different scales, is emphasised by Norman et al. (2012) as central within studies of hydrosocial processes. Understanding the water as a flow resource is enhanced by the inclusion of scalar politics (Norman et al., 2012). In so doing, the focus on local participation in river management is enhancing the understanding of the river as a flow at the local scale and in relation to local government. A process on the local scale that is prevalent within this perspective, is the riverside dike.

Setiawan (2002) explores how the construction of the riverside dike along the Code river is connected to urban development and improvement of water treatment. He argues that he can show how through this project, “it is possible to integrate environmental goals into urban redevelopment schemes” (Setiawan, 2002, p. 72). According to him, the riverside dike project had several implications. Support from the government gave the communities the security to improve the area further within other projects. It has also shown how important cooperation between local government and the communities are in succeeding with the project, and especially the acknowledgement from the government in facing an on paper illegal settlement. In other words, Setiawan argues that the project succeeded as the community was given security both financially and managerial, their close cooperation, and the utilization of the *gotong royong* - spirit (“sharing burden or mutual cooperation”) of the kampung people (Setiawan, 2002, p. 74).

Interestingly, Guinness (2020) paints a different picture of the cooperation between government and community in the construction of the riverbank. He argues that the community was not consulted at all in the construction but was disempowered. As he puts it: “Reflecting government stigmatization of kampung populations as incapable and inept, the kampung attitude for cooperative and resourceful engagement with hazards and change was ignored” (Guinness, 2020, p. 430). Setiawan (2002, p. 74) on the other hand, states that although several governmental- and non-governmental agencies was involved and provided different services during the project, “it was the community that managed the whole project”.

Is it possible to see a bridging of these two perspectives on the cooperation of the project? The perspective on the community’s role and participation in urban river governance is especially reflected on in the study of Andie A. Wicaksono (2020), and it could be of help here. He sees the riverside dike project in relation with an overall movement and development strategy M3K, as presented above. The project was initiated by the *Forum Komunikasi Winongo Asri (FKWA)* (Winongo Communication Forum) and is presented alongside other projects related to urban river governance in Yogyakarta, which together is part of the urban river governance framework of Yogyakarta, developed by him (Wicaksono, 2020, p. 9).

He presents three cases from different parts of Yogyakarta, where these strategies have been implemented along the rivers Code and a side-river of Winongo. These projects, Wicaksono argue, are an example of how the urban river governance in Yogyakarta are influenced by both top-down and bottom-up approaches, that together leads to a successful implementation of what he calls “climate adaption policy” (Wicaksono, 2020, p. 9). His study places the rivers of Yogyakarta as central in the city’s strategy for reducing the impact of climate change, and demonstrate how the riversides are areas of cooperation, community engagement, and individual self-awareness. The participation of the local communities is identified as being central for implementing and ensuring the success of the projects. Lastly, he identifies the problem of land-status as something that must be urgently solved for ensuring the successful implementation of future climate adaption programs. Overall, Wicaksono’s (2020) article present a complex picture of the different strategies and levels of governance and management that all are engaged with each other and the Code river area.

Seftyono and Noviyanti (2016, p. 241) also puts Romo Mangun as the initial driver for changing the perspective of the community from, as they put it, “use the river as their disposal to become conservation area”. Like other publications in this section, the authors focus on the importance

of the community and the cooperation with the government in the successful implementation of development plans. They discuss the importance of *Pamerti Code*, a community group for the Code river area, and how this group also have inspired other initiatives in Yogyakarta.

This group is also focused upon by Sanjaya and Shiki (2016), as part of their study of community-based organization in Jakarta and Yogyakarta. Originating in the 2000s as a voluntary movement for keeping the river clean, it was formally established in 2009 when the government of the city acknowledged it as a “partner in implementing slum upgrading and poverty alleviation programs” (Sanjaya & Shiki, 2016, p. 175). In addition to collaborating with the city government, Pamerti Code is also an example of local-to-local participation and collaboration. Seftyono and Noviyanti (2016) focus on the benefit of the group for creating bonding between communities, in its role as a creator of social networks and communication forums. They also point to how these networks facilitates a better collaboration with government and NGOs.

What all of these publications have in common, is the focus on the community and local leaders in the issues of urban development and management. Local community participation could therefore be identified as an important aspect of the management strategies related to the Code river area. The articles above emphasise the importance the community have had, both in regard to the implementation of structures like the riverside dike, the M3K-project, in the reception of the KIP, and acknowledgment of riverside development through Pamerti Code.

Could this focus on participation and the importance of the local community be understood as an expression of the laying the responsibility on the community, and in thus alleviating the responsibilities connected to the political structures of the urban development? An article which could give some insight into this understanding is Dania and Ihsan (2017) quantitative study on the correlation between self-medication on child-diarrhoea, and knowledge and education level. The majority of the respondents did not administer the self-medication correctly, or as the authors puts it, “the rationality of the diarrhoea medication” (Dania & Ihsan, 2017, p. 2). Focusing on knowledge and education levels of the respondents in relation to self-medication of diarrhoea, could be understood as an expression of the responsibility of the respondents themselves, and not the structural problems of poverty, lack of sanitation services, and education.

As also many of the publications here note, the top-down trend of management is apparent, especially through the governments problematization of the kampung. Additionally, there’s the

down-up engagement that is needed to either ensure the success of the plans or is used as an explanation for the non-success. This identifies the power the local population has in issues of urban development and riverside management, which Pamerti Code's work with improving the riverside area through local-local and local-regional collaboration is an example of. The aspect of scale of the management is central in this understanding of the river governance in the Code river area. The processes of river management, then, can be understood as socio-political processes in which the river and its material properties is connected to flows of power (Swyngedouw, 2004). This power flows through several scalar levels, as it engages with different instances of power on different levels in the city, connecting the processes of river management in the Code river area to political processes on city-level.

Could this power, as understood through the framework of situated UPE, be identified as being relational and diffuse? In understanding power as relational, Lawhon et al. (2014, p. 508) advocate for the understanding of power as not only connected to capital accumulation, but also "identity, (such as race and gender), discursive power, and knowledge claims". This understanding emphasise how power is enacted as opposed to residing and is therefore diffuse.

Considering this on the power of the communities in the kampungs in the Code river area, then, enables us to understand how they have power through their activities and engagement, but also their unique identity and knowledge. This is apparent also in the perspectives considered in chapters 8.3 and 8.4. This understanding of how the kampung has power enables a consideration of how it is the uniqueness of exactly this area that is also part of what makes change on the local inhabitants' terms, possible. Here we see the possibilities of situated UPE to explore how and where actual change can be made. This is especially interesting and relevant considering the next perspective, where the river is given more attention.

8.6 Meanings of water: Traditional ecological knowledge and ecosystem services

After some perspectives with a focus primarily on river management, local participation and spatial planning, this section presents a perspective which in a higher degree deals with the local meaning and value of the river area connected to the community. Here, understanding the river as a socionatural flow which engages with several social, cultural, and religious sides of the kampung is central in the understanding the nature-society relations of the area.

Seftyono (2010) studies the relation between ecological issues of Code river and the traditional ecological knowledge (TEK) of the kampung, to understand how the management of ecosystem

services are not free of value, and that these are related to the local community's traditional knowledge. By engaging with TEK, Seftyono (2010) argues that one can study the relation between 'humankind' (as Seftyono, 2010, puts it) and nature, and how this relation is informed and influenced by that said traditional ecological knowledge. Seftyono (2010) refers to Norton (1995) when reviewing social and cultural values of ecosystem services. "The value of ecosystem services referred to social, cultural and political aspect are more related to the process of value than the real existed entity" (Seftyono, 2010, p. 2). In other words, the process of valuation of ecosystem services is highly related to the community, and the value a community gives to an ecosystem service are related to the community's relationship with said ecosystem.

Based on this, I would say that Seftyono (2010) discusses the Code river as a particular river ecosystem that gets its valuation from the social, cultural and political aspects that are related to it. Here, TEK plays a role in valuing the ecosystem. Through the article, Seftyono (2010, p. 4) shows how there are activities connected to the TEK of the area, "that demonstrates the relationship between humans and ecosystems in the Kampung Code". These include the Code river as an area of "economic and cultural potential" that can establish Code river as a tourist destination, and especially through *Merti Code*.

Merti Code is an annual cultural event with historical ties to former river ceremonies and ritual activities. Now it is an event which both deals with promoting awareness of the ecological functions and importance of Code river, in addition to being a way for the community to express their gratitude of the river and its services to the communities (Sanjaya & Shiki, 2016; Seftyono, 2010). Pamerti Code, the community group discussed in the previous section, is the organizer. The event also plays a role in strengthening Code river as a connector of two objects of Javanese mysticism, as explored in chapter 7 (Seftyono, 2010).

In the conference proceeding "Kali Code: From Merapi to Sustainable Society", Seftyono (2012) elaborate more on the theme based on the same fieldwork as in Seftyono (2010). Here, he connects TEK with the concept of sustainability. He starts with looking at how the people living at Code become connected to Mount Merapi through the river as a volcanic mudflow at times of eruption. Seftyono (2012, findings and discussion, 5th paragraph) argues that their unwillingness to move despite eruptions establishes "a concrete relationship form between ecosystem existence or Kali Code with the Kampung Code society in river utilization as a part of their lives". He also paints a picture of a Code river which through its riverbanks with space

to live on, with continuous sedimentation of sands available to make an income on, “river banks and Kali Code itself has become a source of income for residents who can sustain their lives and their descendants” (Seftyono, 2012, second to last paragraph).

This perspective gives strong connotations to the understanding of the Code river area as part of a grander religious picture painted within Javanese mysticism, as presented in chapter 6.3 by an engagement with Yusuf and Purwandani (2020). It is certainly an aspect that refers to a connection between the river and the city that goes beyond the material world, and engages with strong religious, cultural and social aspects. It gives a new dimension to the Code river area as an area where the water flows through religious and culture through the inhabitants value and understanding of it. Through the communities and Merti Code, these relations become materialised in ways that change the waterscape into a space which reflects the strong relations between these aspects.

Furthermore, the focus on TEK and the effects of Merti Code deepen the understanding of how power is enacted in the Code river area. The traditions and local knowledge connected to the area gives the inhabitants power of identity and knowledge, which is exactly what Lawhon et al. (2014) is focusing upon. The physical capacities and the material conditions of the river is also included through the focus on the ecological aspects of the river in both the religious understanding and the focus on the ecological knowledge of the river as highlighted within TEK.

The article by Soemardiono and Gusma (2014) also engages with the concept of ecosystem and the ecological functions of the Code river area through their focus on the area as an urban landscape. They base themselves on the description by Andersson (2006) on urban landscapes as “socio economical systems where natural and social processes work together within the ecosystems” (Soemardiono & Gusma, 2014, p. 4). By doing so, they facilitate a study of how the conservation of the Code river can be improved through an engagement with both the ecological functions of the river, and the public space that the landscape creates. Through analysing five sections along the Code river area, and the problems attached to the waterfront in these, they develop some concepts for “a new development of *Code* river”, in cooperation with local traditional knowledge and in line with the concept of sustainability (Soemardiono & Gusma, 2014, p. 11, emphasis in original).

This is interesting in that it focuses on the value of the river in urban landscape development. The article by Soemardiono and Gusma (2014) considers how the river is important in relation

to the city, through its perspective of it as a part of the socio-economical system that constitutes the urban landscape. However, it is apparent that their understanding of nature is not the one of the socionatural understanding of the processes of hybridization as UPE. As they focus on urban landscape design, the focus is on the aesthetic qualities of the riverside, and how the riverside can be changed and its functions as an aesthetic riverside can be improved. This can also be found in the article by Seftyono (2010). The 'nature' in this equation remains on the river as an ecosystem and its services to the human society, and the river is seen as a social and cultural resource to the kampung, through its material properties understood as its ecosystem services. With including the materiality in the discussion, I argue that it is possible to see how the water is part of the social, cultural and religious life of the kampung through the meanings related to its flow.

Different meanings of water are also explored by Seftyono, Setiawan, and Arditama (2017). They relate this to relations of power and water management and ask the question: "Who has the authority to interpret science on water?" (Seftyono et al., 2017, p. 156). Based on stating that the difference in the different meanings is connected to knowledge and the authority of each actor, they argue that "the understanding the academia has about science is more detailed and deep compared with the knowledge the general public have" (Seftyono et al., 2017, p. 156). By using research results from the Code river banks in Yogyakarta and the Diwak hot water bathing site in Semarang, they observe that the public's meaning of water differ considerably from the ones of academia and the government. This they argue is due to the "communalism spirit", and the public's "strong willingness to use water collectively" (Seftyono et al., 2017, p. 157). Through demonstrating how the role of the meanings of water in the development and the implementation of policy related to water management is, they make the argument that policy related to water management must consider the different meanings and interpretations of water (Seftyono et al., 2017, p. 160). This article is interesting as it engages directly with how different meanings of water, and the power and authority between the different actors, influence the management of water and should therefore be considered.

Overall, this perspective points to some aspects of the hydrosocial cycle in that it considers the material properties of the river and the value prescribed to it and looks at the connection between this and the social aspects of maintaining and developing the riverfront. It also points to how the meanings of water in the area are active in and between actors and their activities. This way, the Code river area can be understood as a socionatural space produced through the

different meanings of the river. This way, the river becomes part of the hybridization process of the area through the meanings and values attached to it.

8.7 Code river area as a tourist destination

As mentioned in chapter 7, Yogyakarta is a major tourist destination in Indonesia. The number of articles that include tourism in some way or another related to the Code river area reflect this. One development connected to tourism is the establishment of *kampung wisata* (urban village, as Budiarti and Sadali (2013) explore. They study what potential the different kampung chosen to be *kampung wisata* (urban village) in Yogyakarta has, in addition to mapping the spatial distribution (Budiarti & Sadali, 2013, p. 8). Four of twelve kampung wisata are situated on the shores of Code river. However, the Code river only get mentioned in terms of the potential when talking about the kampungs Cokrodiningratan and Dewo Bronto.

The significance of the Code river is highly focused upon when analysing these kampung, and is presented as an enabler for tourism. The presence of the river in the kampung can enable ecotourism and promote activities which revolve around the river, such as river walk and river cleaning. Furthermore, tourism strategies formed around the river also has the potential to bring positive consequences both for the communities themselves, and the river. As they write when talking about Dewo Bronto: “While the river is indirectly preserved by the community, people can take benefit socially and economically from the activity in the Code river” (Budiarti & Sadali, 2013, p. 7). The authors also argue that Cokrodiningratan and Dewo Bronto are more fortunate than other villages, as they can take advantage of the river in their tourism strategy. They also note that this can “change society’s view of the existing settlements on the banks of the River Code” (Budiarti & Sadali, 2013, p. 9).

Tourism is also mentioned by other researchers, though not as the central unit of study. Sanjaya and Shiki (2016) notes how Merti Code and the activities connected to it can promote tourism in the area and be positive economically. The same does Seftyono (2010; 2012) and Seftyono and Noviyanti (2016). Soemardiono and Gusma (2014) investigate the potential of the Code river to be a tourist attraction of Yogyakarta. According to them, the kampung Gemawang has a tourism potential in the form of water recreation, while the kampung Wirogunan is a very popular culinary destination by night and should be further developed. Overall, the authors emphasize the potential for expansion of activities and concept aimed towards tourism. Guinness (2020, p. 433) notes how the 3-meter wide pathway along the river attracts tourists to the kampung, and thus are stimulating kampung services and activities through their presence.

The focus on tourism is interesting because it enables an engagement with the river and the river area as resources through their value as being different from the rest of the city. The materiality of the river area is given both an economic, social and cultural value. It can be understood as being an active agent in the development of the area. Furthermore, the inclusion of the 3-meter wide pathway is demonstrating the connection between risk and vulnerability and measures connected to this, and the connection this has to other factors of the area. The agency of the river then, understood through the material properties and capacities of the river, are both present through security measures, and the socio-economic development of the area.

The economic factor is also present in a fieldwork report resulting from a field visit by Austrian master students in 2017 (Höferl & Sandholz, 2017). During interviews in their research area by the Code river, they are made aware that the neighbouring hotels of the kampung use the areas along the river as an attraction for the guests (Höferl & Sandholz, 2017). The interviewees criticize this approach, and instead argues in favour of an eco-tourism strategy driven by the communities themselves – eco-tourism in this regard meaning “the greening of the spaces near the river to bring tourists into the *Kampung*” (Höferl & Sandholz, 2017, p. 44). This concept of eco-tourism is described as “the accommodation of handcrafts, traditional arts and the use of natural resources, like the river or the riverbanks for tourism attractions” (Höferl & Sandholz, 2017, p. 54). The authors identify the building of hotels inside of the Kampung Terban, is an “external process for the community”, but that this also creates some opportunities for the kampung (Höferl & Sandholz, 2017, p. 56). However, the inhabitants are concerned that a gentrification of the area may happen, and that the tertiary businesses will become a threat to smaller local businesses. Overall, the authors note how tourism are both an internal process related to the communities’ activities, but also an external process which some fear may lead to gentrification of the area.

It is clear that tourism is an important factor related to the economic and social development of the kampung. The articles explored above both focus on positive and negative effects, but the most common thing is how they see the Code river area as having a potential for tourism through its qualities as a riverscape. Water recreation, green areas, and ecotourism in general are factors that are highlighted. The material properties of the river and riverside are internally related to the people and the social structures of the kampung and create unique hydrosocial activities and strategies for development. Understanding the river as a resource is beneficial in this regard, as what is happening is a discovery and an acknowledgement of the values the river has for enabling activities in the area. It also enables a consideration of the political and economic

powers connected to the tourism strategies, which makes it possible to ask the question of who is benefiting from the value of the riverscape, the hotels or the local population?

The river then, is a social and an economical resource for the kampung and is therefore an example of how the agential and material role of the water influence and are influenced by social and economical aspects. Considering the hydrosocial cycle then, this is an example of the influence of the river as a resource, and how it is part of a process of which “water becomes and reveals itself as socio-nature” (Linton & Budds, 2014, p. 176). The tourism of the Code river area cannot be understood without considering its relation to the material properties of the river and the riverside, and vice versa, the river is understood in new ways through its position as a site of tourism. Thus, the river and tourism are both central in the hydrosocial process of the Code river area.

8.8 Focus on technology and engineering

In chapters 6.1 and 6.2, I discussed how UPE literature on urban water in several ways is engaging in a critique of how the modernization of water, and the resulting abstraction of it has been part of the development within water management and governance. UPE sees this expressed through the concepts of IWRM and water governance as defined by the state or other economic and political forces. The belief in engineering and technology as solutions during the 20th century is part of the critique on the modern water paradigm for enhancing the dualistic view of nature and society. In this context then, it is interesting to explore if and how the focus on engineering and technology is prevalent within the research on the Code river and how UPE can be used to understanding this focus.

Nurmandi (2006) introduces new technology for treating black water and wastewater with an installation called Tripikon-S, developed at the Engineering Faculty of the Gadjah Mada University. The paper puts the implementation of new technology within a perspective of community awareness, community organization, and how this new technology can improve the “bad habits” of the inhabitants (Nurmandi, 2006, p. 214). The author conducted three tests of different waters, one in a drinking water well, one test of black and grey water before treatment, and one after treatment. The results showed that the drinking water well was contaminated by e-coli, which indicate the contamination wastewater from toilets and the drainage system, and that the level of contamination decreased following the treatment (Nurmandi, 2006, p. 217).

Nurmandi (2006) position the study in relation to the local communities and their responsibility in ensuring the success of the wastewater management. I note a uniform focus on the

community as the main responsible for the contaminated river, as Nurmandi (2006, p. 214) writes: “Those who settle around the riverside mostly use the river as a wastewater site. They create the problem of having both black water and grey water being discharged directly into river”. The article produces valuable insight into pollution of the drinking water in the Code river area, something that not many articles have focused upon. Considering the critique of technological fixes within water management of UPE literature, the focus on the technological solution of the problem of contamination, and the inhabitant’s responsibility in creating the problem, this article could be an example of how the structural problems of equity and uneven development in the city is ignored within the discourse of urban water management.

The riverbank dike and the 3-meter-wide walkway along the river, as presented and discussed earlier in the chapter, and the general spatial development of the riverside could also be understood as an expression of how technological- and engineering are the main tool, at least at the hands of the government when it comes to managing the waterflow. It is probable that there are more quantitative studies through the perspective of technology and engineering in the Code river area within different fields than has been studied in this analysis. This could be an expression of the publication bias connected to the collection of papers, as discussed in chapter 3. However, the perspective of technology and engineering nonetheless show how the materiality of the river is influencing the life and the riverbank. Furthermore, the focus on the responsibility of the inhabitants themselves, could be seen in connection with community participation as discussed in chapter 8.5. The solutions proposed by the government or other developmental agencies are seen as solutions whose success depends on the participation and management of the inhabitants. This shows how it is both an excuse on the part of the government, and the power of the inhabitants. This situation could then, be seen as diversifying the view UPE has on urban water management strategies.

8.9 The sustainability concept in research on the Code river area

As can be understood from the discussions in the conceptual part of this thesis, the concept of sustainability has in many ways become a central concept in urban water governance and management, in addition to urban and spatial planning. As explored in chapter 6, researchers within UPE have criticized the extended use of the concept within urban water management, arguing that it has become an “empty signifier” that reflects its position within the discourse of ecological modernization (Swyngedouw & Kaika, 2014, p. 467). It could be interesting, then, to explore if “the sustainability paradigm”, as named by Swyngedouw and Kaika (2014, p. 467)

is prevalent within the research on the Code river area as well, and discuss what implications this have.

The concept of sustainability is not prevalent within the research concerned with risk and vulnerability to natural hazards. It is however, quite frequently used by the authors writing about urban development and management in a broad sense. These include Seftyono (2012), Setiawan (2002), Soemardiono and Gusma (2014), Roychansyah and Diwangkari (2009) and Wicaksono (2020). What they all have in common, is that they define sustainability in a broad sense, when defining it at all. Here, sustainability as social, economic and ecological aspects of the term is focused upon, as done by Soemardiono and Gusma (2014). Moreover, they all connect it quite strongly to ‘development’, in almost an interchangeably manner.

Considering the critique by Swyngedouw and Kaika (2014, p. 467) then, this group of documents confirm how the term has become an “empty signifier”. Its position within IWRM and water governance can be an explanation to this, as many of the texts refers back to the Brundtland commissions report and builds on this extensive understanding. The connection to sustainability through the focus on ensuring “shelter for all”, as Roychansyah and Diwangkari (2009, p. 122), is an example of this, as they propose economic strategies of housing development to focus on urban densification. The focus on eco-management and the technological fix is not quite as apparent, but the question then is if this is more prevalent through the perspective of risk and vulnerability to natural hazards. Here, the solutions are in large degree built on technology and engineering, and the role of the local inhabitants are either given the blame or is seen as the solution, dependent on their competence and acceptance or declining of the solutions proposed.

8.10 Summary

This chapter has engaged in an analysis and discussion of prevalent perspectives within research on the Code river area. Eight perspectives were identified, analysed, and discussed using the concepts of UPE of water, engaging thus with research question 2a, 2b and 2c through the categorization and discussion using situated UPE and UPE of water.

Several of the perspectives are connected to each other. Spatial planning and architecture as community development, risk and vulnerability to natural hazards, and local participation as community development are three perspectives that distinguish themselves both in terms of amount of literature and level of connection in between themselves. Several of the publications identified within these perspectives deal with two or more of the mentioned themes, only

distinguished by the emphasis or focus of the study. The perspective regarding the discursive powers of the area as a 'slum', could also be seen as a perspective which binds many of the perspectives together, as this is a discursive thing that are embedded within many of the texts.

Although the theme of TEK and ecosystem services is connected to the research under community development, it stands more on itself as its focus remains on cultural particularities on a more limited empirical basis. Also, the small amount studies that identified through the focus on technology and engineering issues solely is somewhat surprising, although there is a focus on engineering through the publications related to the perspectives on risk and vulnerability, spatial planning and architecture as community development, and local participation in community development.

However, keeping in mind the discussions of power understood through situated UPE, it is interesting to notice the strong focus on community cooperation and participation as part of riverside management and urban development. This is especially clear when considering lack of focus on the more structural problems of the river management. It is possible, of course, that the strong focus on the communities themselves is due to the limited physical area of which the empirical research is concerned and could therefore an expression of publication bias. Nevertheless, the focus on the kampung made for a fruitful discussion of the power relations on different scales in terms of governance and management in the Code river area.

What also is apparent after this analysis, is how the river is active within the perspectives in many ways and forms, in both the physical, social, cultural, and economic aspects of the area. The concepts from UPE as presented in chapter 5.5, especially the river as a material flow and the river as a resource, makes it possible to see the connections between the perspectives, and how the river and the kampung relate to each other in different ways and forms. Furthermore, the employment of situated UPE allowed for exploring how the communities, their practices and everyday life is connected to the river, producing unique relations of power between the material conditions of the urban space and the community.

The next chapter will engage in a concluding discussion as I gather the lines from both the conceptual and the empirical approach of the thesis and discuss how this study of the urban river has enabled an understanding of the nature-society relations in the city. I will also discuss how this conceptual and empirical engagement with UPE of water contributes and is relevant to the discipline of geography and discuss proposals for future research.

9 Concluding discussion: Understanding the hydrosocial urban river area

The previous chapter presented different perspectives within empirical research on the Code river area and analysed and discussed these through an engagement with the concepts of UPE of water and situated UPE. In this chapter I will take a step further and engage in a concluding discussion related to the research questions of both approaches and the overall aim of exploring how the nature-society relations of the city can be understood through the study of the urban river. I will first go through how the research questions have been engaged with throughout the thesis, before I discuss and reflect upon the insights connected to the overall aim of the thesis and proposals for future research.

The two approaches have both separately and together explored ways of gaining greater understanding of the nature-society relations through the engagement with UPE of water on the urban river. The conceptual approach, and particularly chapter 4 and 5, engaged with UPE of water as a framework which enabled an understanding the urban river through the employment of concepts that focus on the interrelatedness of hybrid things, thus understanding the city as a hybrid, whose nature-society relations is constituted through the production processes of socationature. Exploring the river through the hydrosocial cycle and its related concepts put the river within this understanding and provided conceptual tools for the empirical approach. The background of both Marxist theory, historical materialism and urban geography (as explored in chapter 2), furthermore emphasise how UPE is a critical urban theory (Keil, 2020). In my view, this increases the empirical potential of the theorizations of the urban river, as UPE, according to Swyngedouw and Kaika (2014, p. 472), is concerned with the realities of the democratic processes and its influence on socio-ecological transformations. The empirical approach to the urban river further emphasises this point through its engagement with situated UPE.

The engagement with the current trends of UPE and the methodological discussions within the field in chapter 4, allowed for exploring the theoretical and empirical possibilities of studying the urban river through the employment of UPE of water, as expressed through research question 1c. Here, I identified situated UPE as an interesting trend within UPE considering my empirical focus as relatively small-scale and in set in the urban south. Moreover, presenting and discussing situated UPE and methodological city-ism, emphasised the potential and relevance

of using situated UPE methodologically through both approaches, as these both are strands concerned with the methodological and theoretical development of the field. The conceptual and empirical approaches is therefore connected through the engagement of UPE of water and situated UPE in the analysis in chapter 8.

Here, research questions 2a, 2b, and 2c was engaged with. Eight different but related perspectives within research on the Code river area was identified through a thematic analysis of the documents, and was analysed and discussed using the concepts of UPE of water and situated UPE. Considering research question 2b, these were analysed and discussed through the employment of the hydrosocial cycle and its related concepts of hybridity, materiality and understanding the river as a resource. These concepts, when coupled with situated UPE, allowed for exploring how the prevalent perspectives in empirical research on the Code river expressed the hydrosocial relations of the area. This engagement enabled an exploration of the urban development of the Code river area as a hydrosocial process of which the river as a hybrid, material and a valuable flow as a resource are part of and continuously changing and creating the urban space of the Code river area. The riverside dike, the spatial planning and architecture, local participation, tourism, technology and engineering, and the use of the sustainability concept and the ‘slum’ concept in the research are all aspects of the Code river area in which the hydrosocial relations is constituted through its internal relations and processes of hybridization and production of socionature. The tools of situated UPE also allowed for understanding how the local community are part of these processes, which, according to the emphasis placed on participation and the community in the empirical research analysed, are central elements in the Code river area.

The analysis and discussion of different perspectives within research on the Code river area identified different practices, forces, and discourses on the urban river area. This could be connected to how Gabriel (2014, p. 40) argue how the focus on urban imaginaries within UPE “reveals the multiplicity of forces that collude in producing the “urban”” (emphasis in original). Urban imaginaries have been the focus of UPE for a long time, through the consideration of the construction and production of urban spaces and the role of environmental discourses in this production (Gabriel, 2014). The perspectives identified through the empirical approach, and the discussion of them using the concepts of UPE of water, could therefore be understood as an engagement with different urban imaginaries of the urban river area, imaginaries that are both produced through the research, but also through my analysis. This is especially prevalent through the engagement with the use of the ‘slum’ concept in the research, the sustainability

concept, and the different meanings of water. Although I don't engage enough with urban imaginaries throughout the thesis to allow for a deeper exploration, it is nonetheless a way of acknowledging the importance and discursive power of the perspectives themselves, what they express, its influence on the analysis, but also their influence on the academic field of research on the Code river area.

The historical development of the geographic discipline through the changing understandings of 'nature' in chapter 2 serves as a background for understanding how nature-society relations is central within geography, and how this have created an ontological and epistemological divide within the field. More-than-human geography was identified as a field where relational thinking understands water as part of the production process of socionature. In this regard, the contribution of UPE of water through its ontological and epistemological focus on water as part of the process of socionature and the concepts related to this, is presented as a possible way of overcoming this duality within the field. How the engagement of UPE on the urban river can contribute to overcoming the dualistic position physical and human geography within the geographical discipline is therefore related to the conceptual and empirical engagements throughout the thesis and will be further discussed at the conclusion of the chapter.

So far, I've gone through how the research questions have been engaged with throughout the thesis, and what insights this has provided. However, a more detailed discussion and a reflection regarding how these engagements together contribute to the overall aim of the thesis is needed. How and in what ways have the engagements with UPE of water and situated UPE on the urban river contributed to understand the nature-society relations of the city, are there any issues connected to the approaches, and what about future research?

The theoretical and empirical possibilities provided by the engagement of UPE of water on the urban river could be a place to start. This enquiry is engaged with several places in the thesis. It is expressed through the engagement with the different discourses of UPE in chapter 4.3, in addition to chapter 6, and through the analysis and discussion in chapter 8. In many ways, it expresses the ways the conceptual and empirical approaches are connected.

As shown in both chapter 4.3.1 and 6.3, situated UPE is connected to social theory through its roots within southern theory by Connell (2007). As such I find it important to reflect upon whether the focus on situated UPE has diminished the focus on water and the nature-society relations in the analysis, or if I'm able to connect situated UPE to the study of urban water in a constructive way. Remembering the discussion in chapter 8.2, the utilization of situated UPE

allows for considering the understanding of the Code river area as a 'slum' through its focus on discursive power, but bring less focus on the river in this regard. The river is understood through the ecological conditions of the area, of which the Code river area becomes an informal and marginalized area. It considers less the internal relations between the river and society and how it produces this marginalized landscape together.

However, the engagement with situated UPE allows for focusing on the relations of power in the Code river area. As chapters 8.3, 8.5 and 8.6 explored, analysing the everyday practices enable an understanding of how the community enacts their power through activity and participation, TEK and identity. Considering the practices related to the river through Merti Code and community groups as Pamerti Code, TEK connect the community to the river area, and thus become active in the creation of their power. This power is again connected to the river through its meanings and ecosystem services, and in so doing becomes a resource for the urban development of the area and the community. The engagement with situated UPE on the urban river can therefore be seen to provide theoretical and empirical possibilities as it enables an understanding of nature-society relations on a local level through the focus on everyday practices and power as relational and diffuse (Lawhon et al., 2014). Understanding the river as a resource furthermore emphasise the way the river gets involved in these relations.

But does this engagement with situated UPE allow for creating actual change, which Lawhon et al. (2014) argue that it can do? Through an identification of the different areas of which political, social, cultural, and economic forces relates with each other in the area through the focus on the local community, the analysis and discussion at least identify potential areas of conflict between different actors, especially related to the needs of the community. The tourism sector and the adaption to risk are examples in this regard. The identification of these relations on a microlevel in the city, demonstrates the relevance of the focus on everyday practices, and how it contributes to the creation of a more heterogenous UPE (Lawhon et al., 2014). Through this engagement, then, potential areas of further studies are also identified, especially in terms of how flows of water understood as flows of power are embedded in these activities (Swyngedouw, 2004). In so doing, an intensive empirical study of the community groups and their activities in an urban development perspective related to the riverscape could be an interesting point of departure for future studies to get more insight into the hydrosocial relations between the river and the kampung.

The conceptual work done in chapter 6 was to consider UPE literature on urban water and looked at how works within UPE has criticized current trends in water governance and water management. The creation of a situated UPE of the river connected this critique to the studies of the urban river, highlighting the focus on scale in water governance as discussed in chapter 8.4. Moreover, how flows of water happen outside the network and through the everyday life and practices of the inhabitants, is also connected through the processes of collaboration and participation on several scales in the area. This also allows for understanding the river within UPE as different flows of water, through the minimized focus on networked flows (Furlong and Kooy, 2017), the concept ‘archipelago’ (Bakker, 2003a), in addition to considering surface water through the study of distribution of water across space (Zwarteveen et al., 2017). The engagement with situated UPE, then, connects the critique of ‘modern water’ as expressed by Linton (2010) and IWRM and water governance within UPE to the study of the urban river, as a widening “of the range of sites that speak to theory” is done, coupled with the use of socionature within UPE of water (Lawhon et al, 2014, p. 504).

Furthermore, the discussion on the use of the sustainability concept in the research on the Code river area, show how this paradigm also has its foothold within research on the urban river. Considering the critique by Swyngedouw and Kaika (2014), the use of the sustainability concept in the empirical research on the Code river area doesn’t bring much new to the table, as the authors don’t provide a clear clarification of their use of it. This is important, if not to conform to the concept’s underlying assumptions of idea of a “primordial nature” and eco-technological modernization within the current socio-political system as the solution (Swyngedouw & Kaika, 2014, p. 467).

Let’s go deeper into how the conceptual and empirical approach together has led to an understanding of the nature-society relations of the Code river area, and reflect upon the use of the concepts. This is connected to what theories and concepts within UPE of water can be applied to understand the urban river, which was the focus of chapter 5. Here, the hydrosocial cycle, with its related concepts of hybridity, materiality, resources and socionature, is engaged with to understand the urban river. I also engage with the hydrosocial cycle as part of UPEs critique of the abstraction of ‘modern water’, a critique which focused on the hydrologic cycle as something that strengthen a dualistic view and understanding of nature and society within water governance and management (Linton, 2010).

The involvement of the hydrosocial cycle then, emphasise the understanding of the flow of water as not separated from society, but as part of the production processes of socionature, involving metabolism and hybridization as processes which combines and creates in a dialectical manner. It enables an understanding of the Code river area as a hydrosocial riverscape, where water circulates as a “hybridized socio-natural flow that fuses together nature and society in inseparable manners” (Swyngedouw, 2009, p. 56).

However, engaging with the hydrosocial cycle in an empirical context is somewhat a complex ordeal, because based on this understanding, it necessarily involves looking at nearly every aspect of everything, and studying how everything is related in every way. Is it at all possible to get a full picture of the situation? The analysis of the perspectives within the research on the Code river area is an effort to try to identify and understand these relations within particular aspects of the area, through the engagement with concepts of materiality, the river as a resource, production of socionature, and processes of hybridization. However, it is important to be aware of the limitations of the method for understanding the whole picture, and that I here only have explored parts of it. Nonetheless, considering the hydrosocial cycle as a framework for hydroelectrics (Linton, 2010, p. 229), the ontological and epistemological relevance connected to the use of the concept in the thesis is at least emphasised through the conceptual engagement of understanding the urban river as part of the hydrosocial circulation of water, and the empirical engagement of “drawing the hydrosocial cycle” of the Code river area, and thus “yielding practical knowledge of the socio-historical nature of water” (Linton, 2010, p. 231).

Considering research question 2c more in detail, how exactly can these concepts of UPE of water be used to understand the nature-society relations of the Code river area? The use of materiality of the water, power as diffuse and relational, and water as a resource is prevalent throughout the analysis. The agency of the river as a flow, its force and physical power is especially prevalent through the perspective of risk and vulnerability. Understanding this perspective through the concepts of UPE, enable an understanding of the landscape of the area as shaped by the materiality of the force and power of the flow of water. This has formed and created a landscape both physically (through the riverside dike) but also socially. The risks connected with the flood is part of why the area is a marginal and informal space, a space which differs from the rest of the city. The social aspects are also included through the community as an active partner in the development of the area.

This relation is expressed in several ways, as the analysis in chapter 8 show. One central example is community groups like Pamerti Code, which started as a project to take care of the river, but which have, according to the academic texts, expanded its scope and focus. These community groups are also related to the handling of these risks through the project of the riverside dike. As explored through several of the perspectives in chapter 8, the riverside dike is both connected to the perspective of risk and vulnerability as a preventative and adaptive measure, but also to local participation in community development. It can also be seen as a part of the perspective of spatial planning and architecture, as the dike both created and transformed new space in the kampung. This latter perspective relates the riverside dike to issues of social development, as the combined re-orientation of the houses towards the river and the construction of the dike, in addition to the 3-meter-distance-rule, is seen to have changed the mindset of the people living with the river. This then, sketches out a way of how the flow and the material capacities of the river is connected to the urbanization processes of the kampung, and the lives of the people. The water is materialized in the physical and social development of the kampung, thus creating a hydrosocial landscape in which the water, the kampung, the surrounding city and its people, “becomes and reveals itself as socionature” (Linton and Budds, 2014, p. 176).

These preventative measures in form of flood structures, does however, present an interesting paradox. In practice, the houses and the kampung is being distanced physically from the water. But interestingly, this has in some ways led to the inhabitants also coming closer to the river in terms of attitude, of how they relate to it on a daily basis and making the river the centre of their community. So, differing from how Batubara et al. (2018, p. 1191) explores how flood infrastructure is reproducing inequalities and is a “materialization of unequal relations between elite and marginalized populations and as one of the mechanisms which inequalities are reproduced”, this may indicate that the same thing is not happening in the Code river area as it did by the Chiliwung River in Jakarta. The use of the materiality concept on the water flow enables an understanding of how the flood infrastructure of the Code river area is an active part of the improvement of the area, both environmentally (in terms of reducing waste disposal in the river), and socially. Maybe this is because the communities themselves is more involved in the process? This situation has potential for future study, of whether the same process of uneven development connected to the flood infrastructure as Batubara et al. (2018) identifies in Jakarta is present in the Code river area, and in what ways.

This reflection opens up for considering whether the production of nature resulting in uneven development as emphasised by Neil Smith (1984) is possible to relate to the Code river area. Seeing the Code river area as a produced nature through the transformation of nature into labour, could enable us to ask what processes of production of is happening in the area, and for whom. This is in many ways a central question within this research, as the production of nature founded in historical materialism, is at the core of UPE through the concept of socionature. Who are winning, and who are losing in the socio-political development of the Code river area?

Considering the perspective of the Code river area as a tourist destination, the major economic and political forces that are in action in the area, could be reflected upon here. Coupled with the perspective of spatial development and community development, the focus seems to be on increasing the attractivity of the area to achieve an economic gain. Considering the theoretics behind production of uneven development, then, these perspectives understand the river and the riverscape as the means of production in a process which could lead to a certain kind of change of the area. The building of hotels in the riverside areas and the ‘slum’ tourism can be considered as external economic forces that the inhabitants fear will lead to gentrification of the area, in addition to stigmatize the area. In this situation, winners and losers are created through an economic development that could potentially lead to further marginalization of the local inhabitants of the area.

The use of the riverside communities as sites of ‘slum’ tourism by hotels and tourist companies can also be understood as a representation of how the power of definition and representation of the community and the area is taken out of the hands of the inhabitants, and instead are defined by external forces. This shows that it does not take much before the power balance shifts from the communities’ relative power through their everyday activities, knowledge and engagement to those with money and investment power that see the potential and value in the urban riverscape. Here again, I note the emphasis on understanding of the urban river as a resource. The question becomes, then, for whom is the river a resource, and for what?

Could it be that the Code river area is facing a situation where the urbanization processes of the area is facing a turning point, where the power dynamics between the internal and external forces are at the centre? Exploring the tourist strategies of the Code river area then, could be an area of future study through which UPE’s political and normative aspects could thrive through the exploration of the flows of power in the area. Furthermore, the focus on internal and external forces builds on a dualistic view of the processes, which involves that the picture is more

complex than what is reflected through this the analysis and discussion here. Providing a more nuanced picture of the situation could therefore be beneficial.

This makes me aware of a potential issue with the focus of the thesis. Could the focus on the Code river area and the processes within these limits be excluding urbanization processes on city or regional level in relation to the Code river area? Is it then right to consider my research as methodological city-ism which Angelo and Wachsmuth (2015) criticize? Because, despite the focus on the flow of water through the production processes of socionature that I, by leaning on Connolly's (2019) arguments, argued would lead to an avoidance of this critique, in what degree does the focus on the perspectives within research on the Code river area include the metabolic hybrid processes of socionature in the rest of the city, or the region? Considering my research as methodological city-ism, then, could be correct considering the empirical approach relating to a limited geographical area. However, I would also argue that the conceptual engagements of which the empirical approach is built upon, allows for a consideration of the variety of nature-society relations on various scales, reflecting a more varied empirical and conceptual focus. But why should methodological city-ism be a bad thing? Allowing for understanding the varieties of nature-society relations of the urban water flow in the local level is valuable in itself. The water flows on even the lowest of levels, and as shown, its power is not less influential on these levels.

I started this thesis with noting how the discipline of geography is characterized by an ontological and epistemological divide marked by the different ideas and understandings of nature. How has the conceptual and empirical work with UPE on the urban river contributed to overcome the dualistic position of physical and human geography within the geographical discipline?

The focus on the discipline of geography in chapter 2 provided a way of situating the discussion of nature-society relations within the influence of different ideas of nature and its effect on geography as an academic field. In chapter 2, studies on water were identified as an area which within more-than-human geography involved theoretical engagements which in different ways saw nature and society as closely related and intertwined. This gave way for an engagement with UPE of water, which were understood as influenced by the notions of ANT, non-representational theory, relational dialectics, and Marxist theory on the studies of water in the urban realm. This shows that the urban is a relevant ground for studying these relations, as a geographical space in which the socionatural processes creates and combines new spaces and

new relations in a dialectical way. As the theoretical base of UPE of water is built on the theoretics of the production process of socionature, the engagement with these theoretics on the urban river should contribute as something which at least conceptually overcome the dualistic position within the geographical discipline.

Based on the understanding of geographical conditions as results of a process of production where both nature and society are fused together as hybrids, “doing geography”, according to Swyngedouw (1999, p. 461), “implies the excavation and reconstruction of the processes of “the production of nature””. It could be argued, then, that the engagement with geographical conditions as hybrids has the potential of expanding the scope and understanding of the processes of production that also is active within the field of physical geography. However, considering the ontological and epistemological differences within the geographic discipline, this would be a stretch for many. I would nonetheless argue that there is potential within the usage of UPE of water, also within physical geography to become a “more-than-physical geography” (Cresswell, 2013, p. 259). As Cresswell (2013, p. 259) argue, this should be possible through the engagements with hybrids, as dividing fields into human and physical “does not make much sense in such a world”. How such a field would look like I cannot say, but it nonetheless opens up for expanding and developing physical geography in new and interesting ways.

Although it is true, as Cresswell (2013) note, that most geographical researchers within more-than-human geographies are from the field of human geography (such as myself), the theorizations of which more-than-human geographies are built upon open up the possibility for future research within geography for exploring how a geographical site can be studied as parts of the processes of production of socionature. I believe that this engagement can contribute both to unify geography, as Herbert and Matthews (2004) argue for, through the possibilities of both theoretical and empirical collaborations that this enables. Furthermore, it also allows for continuing the exploration of the “divergent research” as a strength of the field of geography, as argued by Castree, Demeritt, and Liverman (2009, p. 8). Water is so flexible, so ever-changing, that accounting for water as a hybrid, with allowing space for considering the material capacities of the water, demonstrate how there is both middle and a new ground to be found within this field. Geographical studies of water as a socionatural hybrid have potential both within human and physical geography and all in between, as the study of the urban river is an example of.

Analysing and understanding the perspectives within research on the Code river through and engagement with concepts of situated UPE, coupled with UPE of water's hydrosocial concepts connected to the process of socionature and of hybridization of the urban, has enabled an understanding of the nature-society relations of the city conceptually and empirically. The conceptual and empirical work in this thesis has explored the role and impact of the river as a material and valuable flow in the socionatural production of the hybrid city. The engagement with situated UPE through the understanding of the relations of power in the Code river area through everyday practices related to the river, has contributed in the project of developing a more heterogenous UPE.

The conceptual and empirical engagements of this thesis have also explored how a geographical entity or condition can be studied through the employment of more-than-human geographies and relational thinking, with the aim of overcoming the dualistic divide within geography. The ontological and epistemological relevancy of this is highlighted through seeing this work as analytical hydroelectics, as it enables an understanding the urban river area as part of the circulation of water through the hydrosocial cycle, and through the production of knowledge of the 'nature' of the waters of the Code river area (Linton, 2010, pp. 229, 231). Considering Castree's (2005, pp. 8-9) reflections on how nature is part of us and not elsewhere, this engagement demonstrates how the 'nature' of the Code river area is integrated within and is a part of Code river area. Through the hydrosocial flow of water, the actions and practices of the local community in the kampung engages with the materiality of the river and together produce the unique urban riverscape of Code.

This knowledge is valuable as it acknowledges and enable a study of the different ways the city and its rivers are connected and produce each other, and how this connection can be understood. This is relevant for both urban development and planning, especially considering the cities of the future. As climate change become a reality, I believe that the knowledge on how the urban riverscape is part of the hydrosocial cycle will prove valuable. The insight into the connections between possible consequences and problems, but also solutions and adaptive strategies connected to urban water, will never not be relevant. Understanding the complex nature-society relations of the city and water's role in this, is in my view central for knowing how to meet and deal with the challenges of today and tomorrow.

References

- Al Jazeera. (2021, August 8). Mount Merapi erupts on Indonesia's Java island. *Al Jazeera*. Retrieved from <https://www.aljazeera.com/news/2021/8/8/indonesia-mount-merapi-erupts>
- Anderson, B., & Tolia-Kelly, D. (2004). Matter(s) in social and cultural geography. *Geoforum*, 35(6), 669-674. doi:10.1016/j.geoforum.2004.04.001
- Andersson, E. (2006). Urban landscapes and Sustainable Cities. *Ecology and Society*, 11(1). Retrieved from <http://www.ecologyandsociety.org/vol11/iss1/art34/>
- Angelo, H., & Wachsmuth, D. (2015). Urbanizing Urban Political Ecology: A Critique of Methodological Cityism. *International journal of urban and regional research*, 39(1), 16-27. doi:10.1111/1468-2427.12105
- Asdal, K., & Reinertsen, H. (2020). *Hvordan gjøre dokumentanalyse : En praksisorientert metode*. Oslo: Cappelen Damm akademisk.
- Atman, R. (1975). Kampong improvements in Indonesia. *Ekistics*, 40(238), 216-220. Retrieved from <http://www.jstor.org/stable/43618571>
- Bai, X., Dawson, R. J., Üрге-Vorsatz, D., Delgado, G. C., Barau, A. S., Dhakal, S., . . . Schultz, S. (2018). Six research priorities for cities and climate change. *Nature*, 555, 23-25. doi:<https://doi.org/10.1038/d41586-018-02409-z>
- Bakker, K. (2002). From state to market?: Water mercantilization in Spain. *Environment and planning. A*, 34(5), 767-790. doi:10.1068/a3425
- Bakker, K. (2003a). Archipelagos and networks: urbanization and water privatization in the South. *The Geographical journal*, 169(4), 328-341. doi:10.1111/j.0016-7398.2003.00097.x
- Bakker, K. (2003b). *An Uncooperative Commodity: Privatizing Water in England and Wales*. Oxford: Oxford University Press.
- Bakker, K. (2007). Trickle Down? Private sector participation and the pro-poor water supply debate in Jakarta, Indonesia. *Geoforum*, 38(5), 855-868. doi:<https://doi.org/10.1016/j.geoforum.2005.11.011>
- Bakker, K. (2009). Water. In N. Castree, D. Demeritt, D. Liverman, & B. Rhoads (Eds.), *A Companion to Environmental Geography* (pp. 515-532). Chichester: Wiley-Blackwell.
- Bakker, K. (2012). Water: Political, biopolitical, material. *Social studies of science*, 42(4), 616-623. doi:10.1177/0306312712441396
- Bakker, K., & Bridge, G. (2006). Material worlds? Resource geographies and the 'matter of nature'. *Progress in human geography*, 30(1), 5-27. doi:10.1191/0309132506ph588oa
- Balibar, E. (1995). *The Philosophy of Marx*. London: Verso.
- Batubara, B., Kooy, M., & Zwarteveen, M. (2018). Uneven Urbanisation: Connecting Flows of Water to Flows of Labour and Capital Through Jakarta's Flood Infrastructure. *Antipode*, 50(5), 1186-1205. doi:10.1111/anti.12401
- Bawole, P., & Sutanto, H. B. (2017). Empowering low-income community in Kampong settlement by exploring people's activities in surrounding environment. *AIP Conference Proceedings*, 1903(3), 080013. doi:<https://doi.org/10.1063/1.5011601>
- Bear, C., & Bull, J. (2011). Guest Editorial. *Environment and Planning A*, 43(10), 2261-2266. doi:<https://doi.org/10.1068/a44498>
- Blaikie, P. (1985). *The political economy of soil erosion in developing countries*. London: Longman.

- Blaikie, P., & Brookfield, H. C. (1987). *Land degradation and society* (Vol. 940). London: Methuen.
- BNPB. (n.d.). Potensi Ancaman Bencana [Potential Threats of Disaster]. Retrieved from <https://www.bnpb.go.id/potensi-ancaman-bencana>
- Booth, A., Sutton, A., & Papaioannou, D. (2016). *Systematic approaches to a successful literature review* (2nd ed.). Los Angeles: Sage.
- Bouleau, G. (2014). The co-production of science and waterscapes: The case of the Seine and the Rhône Rivers, France. *Geoforum*, 57, 248-257. doi:<http://dx.doi.org/10.1016/j.geoforum.2013.01.009>
- Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, 9(2), 27-40. doi:10.3316/QRJ0902027
- BPS. (2020, 15.07.2020). Population of Indonesia by Province 1971, 1980, 1990, 1995, 2000 and 2010. Retrieved from <https://www.bps.go.id/statictable/2009/02/20/1267/jumlah-penduduk-hasil-sensus-penduduk-sp-dan-survei-penduduk-antar-sensus-supas-menurut-provinsi-1971---2015.html>
- BPS Kota Yogyakarta. (2019). *Statistik Daerah Kota Yogyakarta [Regional Statistics Yogyakarta City]*. Retrieved from <https://jogjakota.bps.go.id/publication/2019/12/20/e74e0b7a59c5c0a159701f2b/statistik-daerah-kota-yogyakarta-2019.html>
- BPS Kota Yogyakarta. (2021). *Kota Yogyakarta Dalam Angka [Yogyakarta Municipality in Figures]*. Retrieved from <https://jogjakota.bps.go.id/publication/2021/02/26/4c85e0454525ceebd064473a/kota-yogyakarta-dalam-angka-2021.html>
- Bradshaw, M., & Stratford, E. (2010). Qualitative Research Design and Rigour. In I. Hay (Ed.), *Qualitative research methods in human geography* (3rd ed., pp. 69-80). Oxford: Oxford University Press.
- Braun, B. (2005). Environmental issues: writing a more-than-human urban geography. *Progress in human geography*, 29(5), 635-650. doi:10.1191/0309132505ph574pr
- Bridge, G. (2009). Material Worlds: Natural Resources, Resource Geography and the Material Economy. *Geography compass*, 3(3), 1217-1244. doi:10.1111/j.1749-8198.2009.00233.x
- Budds, J., & Linton, J. (2009). *Water, Science, Humans: Advancing the Hydrosocial cycle*. Call for papers, issued prior to the annual meeting of the Association of American Geographers, Las Vegas, March 2009.
- Budiarti, C. V., & Sadali, M. I. (2013). *Spatial Distribution on Potential "Kampung Wisata" as Urban Tourism in Yogyakarta*. Paper presented at the International Conference : Planning in the Era of Uncertainty (March 4-5, 2013).
- Butterworth, J., Warner, J. F., Moriarty, P., Smits, S., & Batchelor, C. (2010). Finding Practical Approaches to Integrated Water Resources Management. *Water alternatives*, 3(1), 68-81.
- Castree, N. (2000). Marxism and the Production of Nature. *Capital & class*(72), 5-36. Retrieved from <https://www.proquest.com/scholarly-journals/marxism-production-nature/docview/209695978/se-2?accountid=12870>
- Castree, N. (2005). *Nature*. London and New York: Routledge.
- Castree, N. (2011). Nature and Society. In J. A. Agnew & D. N. Livingstone (Eds.), *The SAGE Handbook of Geographical Knowledge* (pp. 287-299). London: London: SAGE Publications Ltd.
- Castree, N., Demeritt, D., & Liverman, D. (2009). Introduction: Making Sense of Environmental Geography. In N. Castree, D. Demeritt, D. Liverman, & B. Rhoads

- (Eds.), *A Companion to Environmental Geography* (pp. 1-15). Chichester: Wiley-Blackwell.
- Chakrabarty, D. (2007). *Provincialising Europe: Postcolonial Thought and Historical Difference* (2nd ed.). Princeton: Princeton University Press.
- CitRes. (n.d.). CitRes : Citizen engagement, Transparency and Transnational Natural Resource Management. Retrieved from <https://www.citres.net/>
- Clifford, N., French, S., & Valentine, G. (Eds.). (2010). *Key methods in geography* (2nd ed.). London: SAGE.
- Connell, R. (2007). *Southern Theory: The Global Dynamics of Knowledge in Social Science*. Cambridge: Polity.
- Connolly, C. (2019). Urban Political Ecology Beyond Methodological Cityism. *International journal of urban and regional research*, 43(1), 63-75. doi:10.1111/1468-2427.12710
- Cope, M. (2010). Coding Qualitative Data. In I. Hay (Ed.), *Qualitative research methods in human geography* (pp. 281-294). Oxford: Oxford University Press.
- Cresswell, T. (2013). *Geographic Thought : A Critical Introduction*. Retrieved from <http://ebookcentral.proquest.com/lib/ntnu/detail.action?docID=1120605>
- Dania, H., & Ihsan, M. N. (2017). Relation of knowledge and level of education to the rationality of self-medication on childhood diarrhea on the Code River banks in Jogoyudan, Jetis, Yogyakarta. *IOP Conference Series: Materials Science and Engineering*, 259(2017). doi:10.1088/1757-899X/259/1/012015
- Dowling, R. (2016). Power, Subjectivity, and Ethics in Qualitative Research. In I. Hay (Ed.), *Qualitative research methods in human geography* (4th ed., pp. 29-44). Oxford: Oxford University Press.
- Edgeworth, M. (2014). On the agency of rivers. *Archaeological Dialogues*, 21(2), 157-159. doi:10.1017/S1380203814000166
- Ekers, M., & Loftus, A. (2008). The Power of Water: Developing Dialogues between Foucault and Gramsci. *Environment and planning. D, Society & space*, 26(4), 698-718. doi:10.1068/d5907
- England, K. V. (1994). Getting personal: Reflexivity, positionality, and feminist research. *The Professional Geographer*, 46(1), 80-89. doi:<https://doi.org/10.1111/j.0033-0124.1994.00080.x>
- Everard, M., & Moggridge, H. L. (2012). Rediscovering the value of urban rivers. *Urban Ecosystems*, 15(2), 293-314. doi:10.1007/s11252-011-0174-7
- Fathmawati, F., Fachiroh, J., Sutomo, A. H., & Putra, D. P. E. (2018). Origin and distribution of nitrate in water well of settlement areas in Yogyakarta, Indonesia. *Environmental Monitoring and Assessment*, 190(11), 628. doi:<https://doi.org/10.1007/s10661-018-6958-y>
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, 5(1), 80-92. doi:10.1177/160940690600500107
- Fischer, F., & Hajer, M. A. (1999). *Living with nature : environmental politics as cultural discourse*. New York: Oxford University Press.
- Ford, L. R. (1993). A Model of Indonesian City Structure. *Geographical Review*, 83(4), 374-396. doi:10.2307/215821
- Francis, R. A. (2012). Positioning urban rivers within urban ecology. *Urban Ecosystems*, 15(2), 285-291. doi:10.1007/s11252-012-0227-6
- Franklin, A. (2017). The more-than-human city. *The Sociological Review*, 65(2), 202-217. doi:<https://doi.org/10.1111/1467-954X.12396>

- Furlong, K., & Kooy, M. (2017). Worlding Water Supply: Thinking Beyond the Network in Jakarta. *International journal of urban and regional research*, 41(6), 888-903. doi:10.1111/1468-2427.12582
- Gabriel, N. (2014). Urban Political Ecology: Environmental Imaginary, Governance, and the Non-Human. *Geography compass*, 8(1), 38-48. doi:https://doi.org/10.1111/gec3.12110
- Gandy, M. (2002). *Concrete and Clay : Reworking Nature in New York City*. Cambridge, MA: The MIT Press.
- Gandy, M. (2006). The bacteriological city and its discontents. *Historical geography*, 34, 14-25. Retrieved from <https://ejournals.unm.edu/index.php/historicalgeography/article/view/2915/2394>
- Geocitra Consultant. (1985). *Studi Kawasan Rawan Bencana [Study of disaster prone areas]*. Yogyakarta.
- Gibbs, M. (2001). Toward a strategy for undertaking cross-cultural collaborative research. *Society & Natural Resources*, 14(8), 673-687. doi:10.1080/08941920120547
- Ginn, F., & Demeritt, D. (2009). Nature: A Contested Concept. In N. J. Clifford, S. L. Holloway, S. P. Rice, & G. Valentine (Eds.), *Key Concepts in Geography* (2nd ed., pp. 300-311). London: SAGE Publications.
- Gleick, P. H. (2000). The changing water paradigm - A look at twenty-first century water resources development. *Water International*, 25(1), 127-138. doi:10.1080/02508060008686804
- Global Water Partnership (GWP). (2020, 25.05.2020). The Need for an Integrated Approach. Retrieved from <https://www.gwp.org/en/About/why/the-need-for-an-integrated-approach/>
- Gold, M. (1984). A history of nature. In D. Massey & J. Allen (Eds.), *Geography Matters!* London: Cambridge University Press.
- Goldfischer, E., Rice, J. L., & Black, S. T. (2020). Obstinate curiosity and situated solidarity in urban political ecology. *Geography compass*, 14(2), e12479. doi:https://doi.org/10.1111/gec3.12479
- Google earth. (n.d.-a). [Map of Java]. Retrieved November 12, 2021 from <https://earth.google.com/web/@-7.39276841,110.43237052,1247.80125948a,1180142.82618508d,35y,0h,0t,0r>
- Google earth. (n.d.-b). [Map of Yogyakarta]. Retrieved October 30, 2021 from https://earth.google.com/web/search/Yogyakarta,+Yogyakarta+City,+Yogyakarta,+Indonesia/@-7.79694854,110.36989305,101.02990733a,7115.12471958d,35y,0h,0t,0r/data=CigiJgokCTuBOgwUIB_AEeu4tTs-Th_AGVceCB-6mltAicgzdty1FtA
- Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global Change and the Ecology of Cities. *Science*, 319(5864), 756-760. doi:doi:10.1126/science.1150195
- Guinness, P. (2020). Managing Risk in Uncertain Times. *Ethnos*, 85(3), 423-434. doi:https://doi.org/10.1080/00141844.2018.1543341
- Gurnell, A., Lee, M., & Souch, C. (2007). Urban Rivers: Hydrology, Geomorphology, Ecology and Opportunities for Change. *Geography compass*, 1(5), 1118-1137. doi:https://doi.org/10.1111/j.1749-8198.2007.00058.x
- Hampton, M. P. (2003). Entry points for local tourism in developing countries: evidence from yogyakarta, indonesia. *Geografiska Annaler: Series B, Human Geography*, 85(2), 85-101. doi:https://doi.org/10.1111/1468-0467.00133
- Haraway, D. (1991). *Simians. Cyborgs and Women - The Reinvention of Nature*. London: Free Association Books.

- Harvey, D. (1973). *Social Justice and the City*. Oxford: Blackwell.
- Harvey, D. (1984). On the history and present condition of geography: An historical materialist manifesto. *The Professional Geographer*, 36(1), 1-11. doi:10.1111/j.0033-0124.1984.00001.x
- Harvey, D. (1996). *Justice, Nature and the Geography of Difference*. Cambridge, Mass: Blackwell.
- Herbert, D. T., & Matthews, J. A. (2004). Geography : Roots and continuities. In J. A. Matthews & D. T. Herbert (Eds.), *Unifying Geography : Common heritage, shared future* (pp. 3-18). London and New York: Routledge.
- Heryanti, D. N. (2012). *Community based approach to assess flood risk perception and coping mechanism along Code River, Yogyakarta Municipality*. (Master thesis, University of Twente, Gadjah Mada University). Retrieved from <http://essay.utwente.nl/84763/1/heryanti.pdf>
- Heryanti, D. N., & Kingma, N. C. (2012). Community based approach to assess flood risk perception along Code river. *Indonesian Journal of Geography*, 44(2), 134-149. Retrieved from <https://jurnal.ugm.ac.id/ijg/article/view/2395>
- Heynen, N., Kaika, M., & Swyngedouw, E. (2006). Urban political ecology: politicizing the production of urban natures. In N. Heynen, M. Kaika, & E. Swyngedouw (Eds.), *In the Nature of Cities: Urban political ecology and the politics of urban metabolism* (pp. 1-20). London and New York: Routledge.
- Holt-Jensen, A. (2007). *Hva er geografi [What is geography]*. Oslo: Universitetsforlaget.
- Hommel, L., & Boelens, R. (2017). Urbanizing rural waters: Rural-urban water transfers and the reconfiguration of hydrosocial territories in Lima. *Political Geography*, 57, 71-80. doi:<https://doi.org/10.1016/j.polgeo.2016.12.002>
- Horton, R. E. (1931). The field, scope, and status of the science of hydrology. *Eos, Transactions American Geophysical Union*, 12(1), 189-202. doi:<https://doi.org/10.1029/TR012i001p00189-2>
- Houben, V. J. H. (1994). *Kraton and Kumpeni, Surakarta and Yogyakarta, 1830-1870*. Leiden: KITL University Press.
- Huysen, A. (Ed.) (2008). *Other cities, other worlds : urban imaginaries in a globalizing age*. Durham and London: Duke University Press.
- Höferl, K. M., & Sandholz, S. (Eds.). (2017). *Urban Resilience in Indonesia - Assessing and Evaluating Development Strategies in Yogyakarta and Surakarta*. Project study at the master course “Global change – Regional Sustainability” at the Institute of Geography at the University of Innsbruck. September 2017. 224 pp. ISBN 978-3-901182-78-5. Retrieved from <https://www.uibk.ac.at/geographie/shop/inngео>
- ICWE (International Conference on Water and the Environment). (1992, 26-31 January). *The Dublin Statement and Report of the Conference*. International Conference on Water and the Environment: Development Issues for the 21st Century, 26-31 January, Dublin, Ireland.
- Idham, N. C. (2018). Riverbank settlement and humanitarian architecture, the case of Mangunwijaya's dwellings and 25 years after, Code river, Yogyakarta, Indonesia. *Journal of Architecture and Urbanism*, 42(2), 177-187. doi:<https://doi.org/10.3846/jau.2018.6900>
- Jasanoff, S. (Ed.) (2004). *States of knowledge: the co-production of science and the social order*. London and New York: Routledge.
- Java. (2021). In *Encyclopedia Britannica*. Retrieved from <https://www.britannica.com/place/Java-island-Indonesia>
- Johnston, B. R. (2003). The Political Ecology of Water: An Introduction. *Capitalism Nature Socialism*, 14(3), 73-90. doi:10.1080/10455750308565535

- Kaika, M. (2005). *City of Flows: Modernity, Nature and the City*. Abingdon: Routledge.
- Karr, J. R., & Chu, E. W. (2000). Sustaining living rivers. *Hydrobiologia*, 422(0), 1-14.
doi:10.1023/A:1017097611303
- Kasto. (1976). *Pertambahan Penduduk Kotamadya Yogyakarta [Population Growth of Yogyakarta Municipality]*. Yogyakarta: Lembaga Kependudukan, Universitas Gadjah Mada.
- Keil, R. (2003). Urban political ecology. *Urban Geography*, 24(8), 723-738.
doi:10.2747/0272-3638.24.8.723
- Keil, R. (2005). Progress report—urban political ecology. *Urban Geography*, 26(7), 640-651.
doi:10.2747/0242-3638.26.7.640
- Keil, R. (2020). An urban political ecology for a world of cities. *Urban Studies*, 57(11), 2357-2370. doi:<https://doi.org/10.1177/0042098020919086>
- Keil, R., Bell, D. V. J., Penz, P., & Fawsett, L. (Eds.). (1998). *Political ecology : global and local*. London: Routledge.
- Keil, R., & Boudreau, J.-A. (2006). Metropolitica and metabolism : Rolling out environmentalism in Toronto In N. Heynen, M. Kaika, & E. Swyngedouw (Eds.), *In the nature of cities : urban politica ecology and the politics of urban metabolism* (pp. 41-62). London: Routledge.
- Kirch, S., & Mitchell, D. (2004). The nature of things: dead labor, nonhuman actors, and the persistence of Marxism. *Antipode*, 36, 687-705.
- Kitchin, R., & Tate, N. J. (1999). *Conducting research in human geography : theory, methodology and practice*. Retrieved from <https://ebookcentral.proquest.com/lib/ntnu/detail.action?docID=1574780>
- Knapp, R. K. (2014). When does 'fieldwork' begin? Negotiating the pre-field ethical challenges. In J. Lunn (Ed.), *Fieldwork in the Global South : ethical challenges and dilemmas* (pp. 13-24). Abingdon: Routledge.
- Kooy, M., & Walter, C. T. (2019). Towards A Situated Urban Political Ecology Analysis of Packaged Drinking Water Supply. *Water*, 11(2), 225.
doi:<https://doi.org/10.3390/w11020225>
- Kooy, M., Walter, C. T., & Prabaharyaka, I. (2018). Inclusive development of urban water services in Jakarta: The role of groundwater. *Habitat International*, 73, 109-118.
doi:<https://doi.org/10.1016/j.habitatint.2016.10.006>
- Krishna. (2014, March 12). Pemukiman Kali Code dimulai dari RT 127a [The Kali Code settlement started from 127a]. *Merdeka.com*. Retrieved from <https://www.merdeka.com/peristiwa/pemukiman-kali-code-dimulai-dari-rt-127a.html>
- Kumorotomo, W., Darwin, M., & Faturochman, F. (1995). The implementation of slum and squatter improvement programs in the river basins of Yogyakarta. *Populasi*, 6(2), 33-42. doi:10.22146/jp.11457
- Kusno, A. (2020). Middling urbanism: the megacity and the kampung. *Urban Geography*, 41(7), 954-970. doi:10.1080/02723638.2019.1688535
- Labuschagne, A. (2003). Qualitative research--airy fairy or fundamental? *The Qualitative Report*, 8(1), 100-103. doi:<https://doi.org/10.46743/2160-3715/2003.1901>
- Latour, B. (1993). *We have never been modern*. Harlow: Pearson Education.
- Lawhon, M., Ernstson, H., & Silver, J. (2014). Provincializing urban political ecology: Towards a situated UPE through African urbanism. *Antipode*, 46(2), 497-516.
doi:<https://doi.org/10.1111/anti.12051>
- Lefebvre, H. (1991). *The Production of Space*. Oxford: Blackwell.
- Lefebvre, H. (2003). *The Urban Revolution*. Minneapolis, MN: The University of Minnesota Press.

- Lefebvre, H. (2016). *Marxist Thought and the City*. Minneapolis, MN: University of Minnesota Press.
- Lian, H. (2011). Kampung Kali Chode, Yogyakarta. Retrieved from <https://architectureindevelopment.org/project.php?id=143#!prettyPhoto>
- Linton, J. (2008). Is the Hydrologic Cycle Sustainable? A Historical-Geographical Critique of a Modern Concept. *Annals of the Association of American Geographers*, 98(3), 630-649. doi:10.1080/00045600802046619
- Linton, J. (2010). *What Is Water? : The History of a Modern Abstraction*. Vancouver: UBC Press.
- Linton, J., & Budds, J. (2014). The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*, 57, 170-180. doi:<https://doi.org/10.1016/j.geoforum.2013.10.008>
- Loftus, A. (2007). Working the Socio-Natural Relations of the Urban Waterscape in South Africa. *International journal of urban and regional research*, 31(1), 41-59. doi:10.1111/j.1468-2427.2007.00708.x
- Loftus, A. (2009). Rethinking Political Ecologies of Water. *Third world quarterly*, 30(5), 953-968. doi:10.1080/01436590902959198
- Loftus, A. (2012). Introduction: Emerging Moments in an Urban Political Ecology. In *Everyday Environmentalism: Creating an Urban Political Ecology* (pp. ix-xxvi). Minneapolis; London: University of Minnesota Press.
- Loftus, A., & March, H. (2016). Financializing desalination: Rethinking the returns of big infrastructure. *International journal of urban and regional research*, 40(1), 46-61. doi: <https://doi.org/10.1111/1468-2427.12342>
- Mackinder, H. J. (1887). On the Scope and Methods of Geography. *Proceedings of the Royal Geographical Society and monthly record of geography*, 9(3), 141-174. doi:<https://doi.org/10.2307/1801248>
- Macklin, M. G., & Lewin, J. (2015). The rivers of civilization. *Quaternary Science Reviews*, 114, 228-244. doi:<https://doi.org/10.1016/j.quascirev.2015.02.004>
- Maidment, D. R. (1993). *Handbook of hydrology*. New York: McGraw-Hill.
- Massey, D. (1999). Space-time, science and the relationship between physical geography and human geography. *Transactions of the Institute of British Geographers*, 24(3), 261-279. Retrieved from <https://www.jstor.org/stable/623127>
- McCann, E., Roy, A., & Ward, K. (2013). Assembling/Worlding Cities. *Urban Geography*, 34(5), 581-589. doi:<https://doi.org/10.1080/02723638.2013.793905>
- Monk, J., & Bedford, R. (2016). Writing a Compelling Research Proposal. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography* (4th ed., pp. 95-116). Ontario: Oxford University Press.
- Mullings, B. (1999). Insider or outsider, both or neither: some dilemmas of interviewing in a cross-cultural setting. *Geoforum*, 30(4), 337-350. doi:[https://doi.org/10.1016/S0016-7185\(99\)00025-1](https://doi.org/10.1016/S0016-7185(99)00025-1)
- Nesbitt, J. T., & Weiner, D. (2001). Conflicting environmental imaginaries and the politics of nature in Central Appalachia. *Geoforum*, 32(3), 333-349. doi:[https://doi.org/10.1016/S0016-7185\(00\)00047-6](https://doi.org/10.1016/S0016-7185(00)00047-6)
- Norman, E., Bakker, K., & Cook, C. (2012). Introduction to the Themed Section: Water governance and the politics of scale. *Water alternatives*, 5(1), 52-61.
- Norton, B. G. (1995). Evaluating ecosystem states: Two competing paradigms. *Ecological Economics*, 14(2), 113-127. doi:[https://doi.org/10.1016/0921-8009\(95\)00024-4](https://doi.org/10.1016/0921-8009(95)00024-4)
- Nurmandi, A. (2006, November). *Towards Community-based Wastewater Management Experience from Urban River Side Settlement in Yogyakarta City Indonesia*. Paper

- presented at the Regional Conference on Urban Water and Sanitation in Southeast Asian Cities, Vientiane, Laos.
- OECD. (2011). *Water Governance in OECD Countries: A Multi-level Approach*. Retrieved from <https://www.oecd-ilibrary.org/content/publication/9789264119284-en>
- Olman, B. (1993). *Dialectical Investigations*. London: Routledge.
- Olwig, K. R. (1996). Nature: mapping the ghostly traces of a concept. In C. Earle, K. Mathewson, & M. S. Kenzer (Eds.), *Concepts in Human Geography* (pp. 63-96). Maryland: Rowman & Littlefield Publishers.
- OpenStreetMap contributors. (n.d.). Peta Kecamatan di Yogyakarta [Map of subdistricts in Yogyakarta]. Retrieved from <https://arcg.is/1W9Cfn>
- Peet, R. (1978). *Radical geography : alternative viewpoints in contemporary social issues*. London: Methuen.
- Peet, R. (1985). The Social Origins of Environmental Determinism. *Annals of the Association of American Geographers*, 75(3), 309-333. doi:10.1111/j.1467-8306.1985.tb00069.x.
- Peet, R., & Hartwick, E. (2015). *Theories of development : contentions, arguments, alternatives* (3rd ed.). New York: Guilford Press.
- Peet, R., & Watts, M. (Eds.). (2004). *Liberation Ecologies: Environment, Development and Social Movements* (2nd ed.). London and New York: Taylor and Francis.
- Perini, K., & Sabbion, P. (2017). *Urban Sustainability and River Restoration : Green and Blue Infrastructure*. Chichester, UK: John Wiley and Sons.
- Phillips, J. (2004). Laws, contingencies, irreversible divergence and physical geography. *The Professional Geographer*, 56(1), 37-43. doi:10.1111/j.0033-0124.2004.05601006.x
- PPLH-UGM. (1994). *Community Development in Code River Basin*. Manuscript
- Rachmawati, R., & Budiarti, C. V. (2016). Use of Space and the Need for Planning in the Disaster-Prone Area of Code River, Yogyakarta, Indonesia. *Indonesian Journal of Geography*, 48(2), 178-190. doi:<https://doi.org/10.22146/ijg.17633>
- Rachmawati, R., Prakoso, E., Sadali, M. I., & Yusuf, M. G. (2017). Riparian planning in Yogyakarta City. *IOP Conference Series: Earth and Environmental Science*, 148, 012009. doi:<https://doi.org/10.1088/1755-1315/148/1/012009>
- Rattu, P., & Véron, R. (2016). Towards a Foucauldian Urban Political Ecology of water: Rethinking the hydro-social cycle and scholars' critical engagement. *Foucault Studies*, June 2016(21), 138-158. doi:10.22439/fs.v0i0.5021
- Robbins, P. (2011). *Political Ecology : A Critical Introduction*(2. ed.). Retrieved from <http://ebookcentral.proquest.com/lib/ntnu/detail.action?docID=822568>
- Roychansyah, M. S., & Diwangkari, A. (2009). *Kampung Oriented Development Model: A Rapid Appraisal of Local Communities*. Paper presented at the CIB - W110 Meeting and Conference: "Sustainable Slum Upgrading in Urban Areas", Surakarta, 16. april 2009.
- Sanjaya, K., & Shiki, K. (2016). Slum Improvement and New Community-based Organizations in Indonesia : Case Studies of Ciliwung Merdeka in Jakarta and Pamerti Code in Yogyakarta. *地域情報研究 = 地域情報研究*, 5, 169-178. Retrieved from <http://www.ritsumei.ac.jp/research/rdiri/file/kiyou/5-12.pdf>
- Seftyono, C. (2010). Local Community in Valuing Ecosystem Services: Warga Kampung Code's Perspective on Kali Code Existence *1st Annual Indonesian Scholars Conference. Taiwan (March 20, 2010)*. doi:<http://dx.doi.org/10.2139/ssrn.1763226>
- Seftyono, C. (2012). Kali Code: From Merapi to Sustainable Society. *International Conference on Sustainable Innovation 2012, International Joint Seminar UMY - IIUM - TU - Eindhoven, Yogyakarta (March, 19-20, 2012)*. doi:<http://dx.doi.org/10.2139/ssrn.2020132>

- Seftyono, C., & Noviyanti, R. (2016). Community, Social Capital and Development Policy in Code Riverbanks. *proceedings of the International Conference on Ethics in Governance (ICONEG 2016)*, 84, 239-243. doi:<https://doi.org/10.2991/iconeg-16.2017.56>
- Seftyono, C., Setiawan, A. B., & Arditama, E. (2017). Water and Society: Contextualization of Science in Politics and Public Policy. *JKAP (Jurnal Kebijakan dan Administrasi Publik)*, 21(2), 152-162. Retrieved from <https://journal.ugm.ac.id/jkap/article/view/26222>
- Service, E. R. (1975). *Origins of the State and Civilization*. New York: W. W. Norton & Company.
- Setiawan, B. (1998). *Local dynamics in informal settlement development: the case study of Yogyakarta, Indonesia*. (Doctoral dissertation). The University of British Columbia, Vancouver. Retrieved from <http://hdl.handle.net/2429/9601>
- Setiawan, B. B. (2002). Integrating environmental goals into urban redevelopment schemes: lessons from the Code River, Yogyakarta, Indonesia. *Water Science and Technology*, 45(11), 71-76. doi:<https://doi.org/10.2166/wst.2002.0381>
- Simone, A. (2004). People as infrastructure: Intersecting fragments in Johannesburg. *Public culture*, 16(3), 407-429. Retrieved from <https://muse.jhu.edu/article/173743/summary>
- Simons, H. (2009). *Case Study Research in Practice*. Los Angeles: SAGE Publications.
- Smith, N. (1984). *Uneven development: nature, capital, and the production of space*. New York, NY: Blackwell.
- Smith, N. (2006). Foreword. In N. Heynen, M. Kaika, & E. Swyngedouw (Eds.), *In the Nature of Cities : urban political ecology and the politics of urban metabolism* (pp. xi-xv). London: Routledge.
- Soemardiono, B., & Gusma, A. F. (2014). The Development of Code River Area in Yogyakarta as a Sustainable Urban Landscape Asset acknowledging Local Traditional Knowledge. *International Review for Spatial Planning and Sustainable Development*, 2(4), 4-18. doi:https://doi.org/10.14246/irspsd.2.4_4
- Song, F., Parekh, S., Hooper, L., Loke, Y. K., Ryder, J., Sutton, A. J., . . . Harvey, I. (2010). Dissemination and publication of research findings: an updated review of related biases. *Health Technology Assessment* 14(8), 1-193. doi:<https://doi.org/10.3310/hta14080>
- Strang, V. (2014). Tributaries. From confusion to confluence in the matter of water and agency. *Archaeological Dialogues*, 21(2), 165-174. doi:10.1017/S1380203814000191
- Sulistiyani, A. T., Yuliani, K., & Yuliana, M. (2017). The Responsiveness and the Ability of “Kampung Tangguh Bencana” in Handling Flood in Yogyakarta City. *The Indonesian Journal of Planning and Development*, 2(2), 94-107. doi:<https://doi.org/10.14710/ijpd.2.2.94-107>
- Sullivan, J. (1992). *Local Government and Community in Java: an urban case study*. Singapore: Oxford University Press.
- Susanto, J., Zheng, X., Liu, Y., & Wang, C. (2020). The impacts of climate variables and climate-related extreme events on island country’s tourism: Evidence from Indonesia. *Journal of Cleaner Production*, 276, 124204. doi:<https://doi.org/10.1016/j.jclepro.2020.124204>
- Swyngedouw, E. (1996). The city as a hybrid: On nature, society and cyborg urbanization. *Capitalism Nature Socialism*, 7(2), 65-80. doi:10.1080/10455759609358679
- Swyngedouw, E. (1997). Power, Nature, and the City. The Conquest of Water and the Political Ecology of Urbanization in Guayaquil, Ecuador: 1880–1990. *Environment and Planning A: Economy and Space*, 29(2), 311-332. doi:10.1068/a290311

- Swyngedouw, E. (1999). Modernity and Hybridity: Nature, Regeneracionismo, and the Production of the Spanish Waterscape, 1890–1930. *Annals of the Association of American Geographers*, 89(3), 443-465. doi:10.1111/0004-5608.00157
- Swyngedouw, E. (2004). *Social power and the urbanization of water : flows of power*. New York: Oxford University Press.
- Swyngedouw, E. (2006a). Circulations and metabolisms: (Hybrid) Natures and (Cyborg) cities. *Science as Culture*, 15(2), 105-121. doi:10.1080/09505430600707970
- Swyngedouw, E. (2006b). Metabolic urbanization. In N. Heynen, M. Kaika, & E. Swyngedouw (Eds.), *In the Nature of Cities : urban political ecology and the politics of urban metabolism* (pp. 21-40). London and New York: Routledge.
- Swyngedouw, E. (2010). Trouble with Nature - Ecology as the New Opium for the People. In J. Hillier & P. Healey (Eds.), *Conceptual Challenges for Planning Theory* (pp. 299-320). Farnham: Aldershot.
- Swyngedouw, E., & Kaika, M. (2014). Urban political ecology. Great promises, deadlock... and new beginnings? *Documents d'anàlisi geogràfica*, 60(3), 459-481. doi:10.5565/rev/dag.155
- Thrift, N. (1996). *Spatial formations*. London: Sage.
- Thrift, N. (2004). Summoning life. In P. Cloke, P. Crang, & M. Goodwin (Eds.), *Envisioning Human Geographies* (pp. 87-109). London: Arnold.
- Toumbourou, T. (2009, March 29). Down by the riverside - Kali Code. *Inside Indonesia*. Retrieved from <https://www.insideindonesia.org/down-by-the-riverside-kali-code>
- Tvedt, T. (2010). 'Water Systems', Environmental History and the Deconstruction of Nature. *Environment and History*, 16(2), 143-166. doi:<https://doi.org/10.3197/096734010X12699419057179>
- Tzaninis, Y., Mandler, T., Kaika, M., & Keil, R. (2020). Moving urban political ecology beyond the 'urbanization of nature'. *Progress in human geography*, 45(2), 229-252. doi:10.1177/0309132520903350
- United Nations. (2015). Transforming our World: The 2030 Agenda for Sustainable Development. Retrieved from <https://sustainabledevelopment.un.org/post2015/transformingourworld>
- Vikør, L. S., & Filseth, G. (2018). Indonesias historie [The history of Indonesia] In *Store norske leksikon*. Retrieved October 24, 2021 from https://snl.no/Indonesias_historie
- Wadel, C. (1991). *Feltarbeid i egen kultur : en innføring i kvalitativt orientert samfunnsforskning [Fieldwork in one's own culture : an introduction to qualitatively oriented social research]*. Flekkefjord: SEEK.
- Watson, C. W. (1994). Review: Untitled [Review of Local Government and Community in Java: An Urban Case-Study, by J. Sullivan]. *Man. New Series.*, 29(4), 1002-1003. doi:<https://doi.org/10.2307/3034001>
- Watts, M. (2005). Nature: culture. In P. Cloke & R. Johnson (Eds.), *Spaces of geographical thought : deconstructing human geography's binaries* (pp. 142-174). London: Sage.
- Wegerif, R. (2020, May 08). How to write 'desk-based' research in education [Blog post]. Retrieved from <https://www.rupertwegerif.name/blog/how-to-write-desk-based-research-in-education#>
- Wertheim, W. F. (1958). *The Indonesian Town: Studies of Urban Sociology*. The Hague: Van Hoeve.
- White, P. (2010). Making use of secondary data. In N. J. Clifford, S. French, & G. Valentine (Eds.), *Key methods in geography* (Vol. 2, pp. 61-76). Thousand Oaks, California: SAGE.
- Whitehead, A. N. (1953). *Science and the Modern World*. Cambridge: The syndics of the Cambridge University Press.

- Whitehead, A. N. (1960). *Process and Reality: An Essay in Cosmology*. New York: Macmillan.
- Whitten, A. J., Soeriaatmadja, R. E., & Afiff, S. A. (1996). *The ecology of Java and Bali*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=1567716&site=ehost-live&ebv=EB&ppid=pp_xv
- Wicaksono, A. A. (2020). Urban river governance through community movement to increase the adaptive capacity to climate change of the poor: a case study of Yogyakarta. *IOP Conference Series: Earth and Environmental Science*, 402(2020), 012003. doi:10.1088/1755-1315/402/1/012003
- Wittfogel, K. A. (1957). *Oriental Despotism: A Comparative Study of Total Power*. New Haven: Yale University Press.
- World Population Review. (n.d.). Yogyakarta Population 2020. Retrieved from <https://worldpopulationreview.com/world-cities/yogyakarta-population>
- World Weather Online. (2021). Yogyakarta Monthly Climate Averages. Retrieved from <https://www.worldweatheronline.com/yogyakarta-weather-averages/daerah-istimewa-yogyakarta/id.aspx>
- Worster, D. (1985). *Rivers of Empire: Water, Aridity and the Growth of the American West*. New York: Pantheon.
- Wynn, G. (2010). Foreword : Making Waves. In J. Linton (Ed.), *What is Water? : the history of a modern abstraction* (pp. ix-xvi). Vancouver: UBC Press.
- Yin, R. K. (2003). *Case study research : design and methods* (3rd ed.). Thousand Oaks, California: SAGE Publications.
- Yin, R. K. (2011). *Qualitative research from start to finish*. New York: The Guilford Press.
- Yin, R. K. (2014). *Case study research : design and methods* (5th ed.). Los Angeles: SAGE Publications.
- Yin, R. K. (2018). *Case study research and applications : design and methods* (6th ed.). Los Angeles: SAGE Publications.
- Yusuf, M., & Purwandani, I. (2020). Ecological politics of water: the ramifications of tourism development in Yogyakarta. *South East Asia Research*, 28(3), 327-343. doi: <https://doi.org/10.1080/0967828X.2020.1821580>
- Zimmer, A. (2010). Urban Political Ecology. Theoretical concepts, challenges, and suggested future directions. *Erdkunde*, 64(4), 343-354. doi:10.3112/erdkunde.2010.04.04
- Zimmerer, K. S. (1994). Human Geography and the "New Ecology": The Prospect and Promise of Integration. *Annals of the Association of American Geographers*, 84(1), 108-125. doi:10.1111/j.1467-8306.1994.tb01731.x
- Zwarteveen, M. (2015). Regulating water, ordering society: practices and politics of water governance. *Inaugural Lecture, University of Amsterdam*.
- Zwarteveen, M., Kemerink-Seyoum, J. S., Kooy, M., Evers, J., Guerrero, T. A., Batubara, B., . . . Wesselink, A. (2017). Engaging with the politics of water governance. *WIREs Water*, 4(November/December 2017). doi:10.1002/wat2.1245

Appendix

Table presenting the research documents of which the document analysis and discussion in chapter 8 is concerned. Provides info on author(s), year of publication, type of academic text, title, and the identified perspective on the Code river area of which it is analysed and discussed through the usage of concepts of UPE of water.

Authors	Year	Type of academic text	Title	Identified perspective on the Code river area
Bawole and Sutanto	2017	Conference proceeding	“Empowering Low-income Community in Kampong Settlement by Exploring People’s Activities in Surrounding Environment”	Discursive powers: the ‘slum’ of Yogyakarta Spatial planning and architecture as community development
Budiarti and Sadali	2013	Conference proceeding	“Spatial Distribution on Potential “Kampung Wisata” as Urban Tourism in Yogyakarta	The Code river area as a tourist destination
Dania and Ihsan	2017	Conference proceeding	“Relation of knowledge and level of education to the rationality of self-medication on childhood diarrhea on the Code River banks in Jogoyudan, Jetis, Yogyakarta”	Local participation in urban development and river management
Guinness	2020	Peer-reviewed journal article	“Managing Risk in Uncertain Times”	Risk and vulnerability to natural hazards Local participation in urban development and river management The Code river area as a tourist destination
Heryanti	2012	Master thesis	“Community based approach to assess flood risk perception and coping mechanism along Code River, Yogyakarta Municipality”	Risk and vulnerability to natural hazards
Heryanti and Kingma	2012	Peer-reviewed journal article	“Community based approach to assess flood risk perception along Code river”	Risk and vulnerability to natural hazards
Höferl and Sandholz	2017	Fieldwork report	“Urban Resilience in Indonesia - Assessing and Evaluating Development Strategies in Indonesia and Yogyakarta”	The Code river area as a tourist destination
Idham	2018	Peer-reviewed journal article	Riverbank settlement and humanitarian architecture, the case of Mangunwijaya’s dwellings and 25 years after, Code river, Yogyakarta, Indonesia”	Discursive powers: the ‘slum’ of Yogyakarta Spatial planning and architecture as community development
Kumorotomo et al.	1995	Peer-reviewed journal article	“The implementation of slum and squatter improvements programs in the river basins of Yogyakarta”	Discursive powers: the slum of Yogyakarta Local participation in urban development and river management

Nurmandi	2006	Conference proceeding	“Toward Community-based Wastewater Management Experience from Urban River Side Management in Yogyakarta City Indonesia”	Focus on technology and engineering
Rachmawati and Budiarti	2016	Peer-reviewed journal article	“Use of Space and The Need for Planning in the Disaster-Prone Area of Code river, Yogyakarta, Indonesia”	Discursive powers: the ‘slum’ of Yogyakarta Spatial planning and architecture as community development Risk and vulnerability to natural hazards
Rachmawati, Prakoso, Sadali, and Yusuf	2017	Conference proceeding	“Riparian planning in Yogyakarta city”	Discursive powers: the ‘slum’ of Yogyakarta Spatial planning and architecture as community development
Roychansyah and Diwangari	2009	Conference proceeding	“Kampung Oriented Development Model: a Rapid Appraisal of Local Communities”	The sustainability concept in research on the Code river area
Sanjaya and Shiki	2016	Journal article	“Slum Improvement and new Community-based Organizations in Indonesia: Case Studies of Ciliwung Merdeka in Jakarta and Pamerti Code in Yogyakarta”	Local participation in urban development and river management Meanings of water: traditional ecological knowledge and ecosystem services The Code river area as a tourist destination
Seftyono	2010	Conference proceeding	“Local Community in Valuing Ecosystem Services. Warga Kampung Code’s Perspective on Kali Code Existence”	Meanings of water: traditional ecological knowledge and ecosystem services The Code river area as a tourist destination
Seftyono	2012	Conference proceeding	“Kali Code: From Merapi to Sustainable Society”	Meanings of water: Traditional ecological knowledge and ecosystem services The Code river area as a tourist destination The sustainability concept in research on the Code river area
Seftyono and Noviyanti	2016	Conference proceeding	“Community, Social Capital and Development Policy in Code Riverbanks”	Local participation in urban development and river management The Code river area as a tourist destination
Seftyono, Setiawan and Arditama	2017	Peer-reviewed journal article	“Water and Society: Contextualization of Science in Politics and Public Policy”	Meanings of water: Traditional ecological knowledge and ecosystem services
Setiawan	1998	Doctoral dissertation	“Local dynamics in Informal Settlement development: a case study of Yogyakarta, Indonesia.”	Discursive powers: the ‘slum’ of Yogyakarta
Setiawan	2002	Journal article	“Integrating environmental goals into urban redevelopment schemes: lessons from the Code River, Yogyakarta, Indonesia”	Spatial planning and architecture as community development Local participation in urban development and river management
Soemardiono and Gusma	2014	Journal article	“The Development of Code River Area in Yogyakarta as a Sustainable Urban Landscape Asset Acknowledging Local Traditional Knowledge”	Spatial planning and architecture as community development Meanings of water: Traditional ecological knowledge and ecosystem services The Code river area as a tourist destination The sustainability concept in research on the Code river area

Sulistiyani, Yuliani and Yuliana	2017	Peer-reviewed journal article	The Responsiveness and the Ability of “ <i>Kampung Tengguh Bencana</i> ” in Handling Flood in Yogyakarta City	Risk and vulnerability to natural hazards
Wicaksono	2020	Conference proceeding	“Urban river governance through community movement to increase the adaptive capacity to climate change of the poor: a case study of Yogyakarta”	Spatial planning and architecture as community development Local participation in urban development and river management The sustainability concept in research on the Code river area

