INFRASTRUCTURE

Water, Territories and Transformations in Turkey, Peru and Spain

Lena Hommes

Propositions

1. Hydraulic infrastructures live and infinitely reincarnate in societal discussions, materials and biophysical environments.
   (this thesis)

2. Both infrastructure construction and infrastructure removal trigger resistance.
   (this thesis)

3. Today's past and future are different from tomorrow's.

4. Synchronizing PhD activities with the menstrual cycle is key for female PhDs well-being and productivity.

5. The paper on which papers are written should be recycled, but not the papers themselves.

6. Just as society and nature co-produce each other, so do research and researcher.

7. We currently live in a world of 'ever more', which makes the possibility of human existence in the future ever less.

8. White privilege must be used for creating a privilege-free world.

Propositions belonging to the thesis, entitled

Infrastructure Lives: Water, Territories and Transformations in Turkey, Peru and Spain

Lena Hommes
Wageningen, 6 July 2022

Infrastructure Lives

Water, Territories and Transformations in Turkey, Peru and Spain

Lena Hommes

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Infrastructure Lives

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Table of contents

FIGURES

TABLES

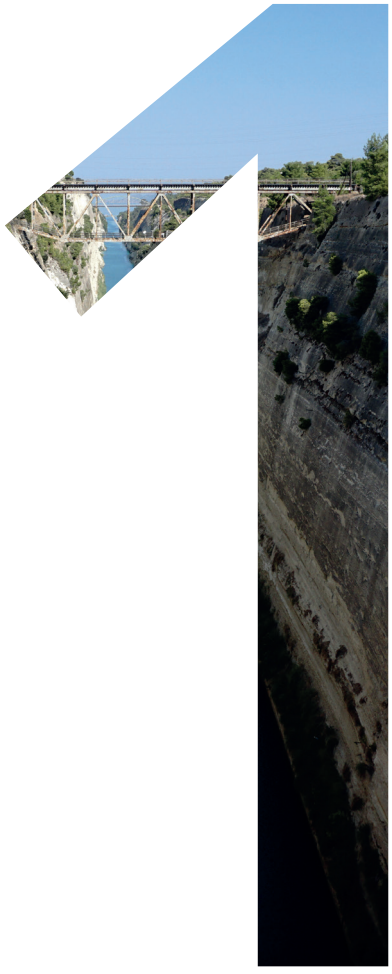
ABBREVIATIONS

AEMS	Asociación para el Estudio y Mejora de los Salmónidos	Association for the Study and Improvement of Salmonids
ALA	Autoridad Local del Agua	Local water authority
ANA	Autoridad Nacional del Agua	National water authority
AKP	Adalet ve Kalkınma Partisi	Justice and Development Party
cf.	confer/conferatur	compare to
COES	Comité de Operación Económica del Sistema Interconectado Nacional	Economic Operation Committee of the National Interconnected System
DSI	Devlet Su İşleri	General Directorate of State Hydraulic Works
ECA	Export Credit Agencies	
EIA	Environmental Impact Assessment	
ENEL	Ente nazionale per l'energia elettrica	National Electricity Board
EPASA	Empresa Peruana de Aguas S.A.	Peruvian Water Company
EU	European Union	
FNCA	Fundación Nueva Cultura del Agua	New Water Culture Foundation
GAP	Güneydoğu Anadolu Projesi	Southeastern Anatolia Project
ha	hectare	
hm	hectometre	
HPP	Hydropower plant	
i.e.	id est	that is
MINAGRI	Ministerio de Desarrollo Agrario y Riego	Ministry of Agrarian Development and Irrigation
MW	Mega watt	
NGO	Non-governmental organisation	
OEFA	Organismo de Evaluación y Fiscalización Ambiental	Environmental Assessment and Enforcement Agency
PES	Payments for ecosystem services	
PKK	Partiya Karkerên Kurdistan	Kurdistan Workers Party
PSOE	Partido Socialista Obrero Español	Spanish Socialist Workers Party
RBA	River basin authority	
SCOT	Social Construction of Technology	
SEDAPAL	Servicio de Agua Potable y Alcantarillado de Lima	Drinking Water and Sewage Service of Lima
SENAMHI	Servicio Nacional de Meteorología e Hidrología del Perú	National Service for Meteorology and Hydrology of Peru
SERNANP	Servicio Nacional de Áreas Naturales Protegidas	Peruvian Service for Natural Protected Areas

STS	Science and Technology Studies	
SUNASS	Superintendencia Nacional de Servicios de Saneamiento	National Superintendency of Sanitation Services
WASS	Wageningen School of Social Sciences	
WCD	World Commission on Dams	
WFD	Water Framework Directive	
WUR	Wageningen University and Research	
WWF	World Wildlife Fund	

Stories matter. Many stories matter. Stories have been used to dispossess and to malign. But stories can also be used to empower, and to humanize. Stories can break the dignity of a people. But stories can also repair that broken dignity. […] When we reject the single story, when we realize that there is never a single story about any place, we regain a kind of paradise.

Chimamanda Ngozi Adichie in her TED Talk
The danger of a single story, 2009



Introduction

1.1 Infrastructure lives and territorial transformations

Territories are those social and geographical spaces where we live our lives, where relations are made and remade, where specific ecologies and materialities exist and change, where interactions take place. Rather than fixed entities, territories are in constant transformation. This process is material, ecological, social, economic, cultural and political all at once. It involves a multitude of diverse actors and their respective interests, powers and visions about what territory is and what it should look like in the future.

Questions about territories, about the order of our lives, our relations as humans to each other and to the ecological and material environment, have long been of concern for societies, philosophers and politicians alike. Visions about 'better worlds' have most explicitly been expressed in utopian narratives such as Plato's *Magnesia*, Thomas More's *Utopia* (completed in 1516) or Francis Bacon's *New Atlantis* (published 1626), to just name a few. In these accounts, better places, better rules and rulers and simply better existences are sketched. In the period of the Enlightenment, political philosophers, scientists and politicians believed that mainly reason and scientific knowledge and method could bring about desirable, better societies and lives. With intensifying industrialization and technological development, reason was further elevated and translated into concrete technologies, which in the age of modernity came to be seen as central for continued progress (Rundell, 2016; Toulmin, 1992). During this time, territorial projects were characterized by ideas about conquering and controlling nature, and enrolling water (and other parts of the environment) as resources in expanding productive economies (Kaika, 2005; Mumford, 1967; Smith, 1984; Weber, 1981 [1927]). At the same time, in each era and concerning each body of thought or utopia, there have always been refutations. For example, romanticists such as Rousseau argued that modern ways of living had corrupted humans and violently alienated them from a 'state of nature' that was originally characterized by minimal desires and a respect for nature (Rousseau, 2019 [1755]; cf. Marks, 2002).

Besides the question of how we as humans should live our lives, many of these political-philosophical debates also inherently touch upon the nature of humans and correspondingly the relation between humans and nature (for an overview of debates see Castree, 2005, 2013; Coates, 1998; Feyerabend, 2016). Whereas Aristotle saw humans as "an animal with the capacity for politics", the Roman poet Lucretius situated humans "fully within the flux and flow of a tumultuous atomic world" (Braun, 2009:

21). For Enlightenment thinkers, on the other hand, humans were intrinsically different because they possessed reason, elevating them above animals or other nonhuman entities; whereas romantics considered nature as separate from humans but beautifully divine, a place where humans could witness and feel a transcendental order. Finally, more recently, there are multiplying voices in academia and beyond that call for considering humans and nature as intrinsically intertwined (Mommaas et al., 2017). However, what this means in terms of perspectives on nature, desirable socionatural relations and territories is far from being univocally answered.

Importantly for this dissertation, many of these societal and political debates, questions and thoughts are present in and through water infrastructure projects. Should water infrastructures such as dams, hydropower plants or water transfers be utilized and celebrated as the ultimate tool for putting reason into practice and elevating human society to a higher stage of progress? Are they part of a shared utopia, a vision of how things should ideally be and lives should be lived? Or is water infrastructure an incarnation of human alienation from nature, a violation of the divine essence of nature, keeping us from truly satisfied, sustainable and peaceful lives? Or is it rather a form of humanized nature that reflects and reinforces 'cemented' social and power relations?

Some of these questions and perspectives come back – implicitly or explicitly – in the different chapters of this dissertation. The point of departure is to consider hydraulic infrastructure as a powerful tool to shape territories and to materialize ideas about what territory is, what it was and what it should be in the future. Infrastructures' significance goes much beyond fulfilling a technical-material purpose only, such as providing drinking or irrigation water, flood control and hydropower production. Hydraulic infrastructure is also always a materialization of specific socioterritorial imaginaries and thereby a way to order and re-order hydrosocial and territorial relations (Acevedo Guerrero, 2018; Gandy, 2014; Kooy & Bakker, 2008; Wittfogel, 1957). Yet, the norms and morals embedded in them as well as their exact material, social, political and cultural effects are commonly concealed behind technical language and grandeur (Akrich, 1992; Latour & Venn, 2002; Shah & Boelens, 2021; Verbeek, 2011; Von Schnitzler, 2013).

This dissertation then is about 'infrastructure lives' in multiple senses: 'lives' as plural noun and 'lives' as third-person singular verb. Infrastructure lives and infrastructure lives. The following chapters can be read as a chronology of different momentums in infrastructural existence and of associated imaginaries about territories and infrastructure. It includes an analysis of the first stage of infrastructure life (conception and

pre-construction discussions), an examination of territorial transformations during infrastructural presence, and inquiries about removal as the potential final phase of an infrastructure's life. At the same time, this thesis is also about how infrastructure lives, develops and acts in hydrosocial territories. It is about those human and nonhuman relations and lives that evolve around infrastructures and that are shaped by infrastructures' manifold material, hydrological, ecological and socio-political effects. So, in short: I examine how living infrastructure shapes lives.

The specific questions I ask are about visions and imaginaries that form the foundation for hydraulic infrastructure construction, and about how these imaginaries change through time; how hydraulic infrastructure materializes imaginaries in expected and unexpected ways; and what effects this brings about for hydrosocial territories. In order to do so, this research gives analytically deep 'snapshots' of diverse unfinished moments of hydraulic infrastructures, territorial transformations and associated imaginaries. It takes the three diverse contexts of Turkey, Peru and Spain to shed light on unfolding infrastructural life and evolving imaginaries about hydrosocial territories and the role infrastructure should play in it. The first case is the Ilısu Dam in southeastern Turkey where I analyse the diverging and highly contested socio-political and territorial imaginaries associated with the dam prior to its construction. The second case is that of the infrastructural complex in the watersheds of Lima, Peru, which is made up of rural-urban water transfers (dams, canals, tunnels) and hydropower plants. This case illuminates how infrastructure construction is intrinsically shaped by modern ideas about domesticating nature through hydraulic infrastructure to reach progress and development; its impacts throughout its existence, and the renegotiation of associated relations triggered by socio-political and ecological changes. The third case looks at dam and weir removal in Spain to scrutinize the contestations arising in the last stage of infrastructural life – decay and removal – and recently emerging new imaginaries about dams, free-flowing rivers and socionatural relations. Hence, this research aims for cross-pollination between at first sight dissimilar cases, to shed light on and raise questions about the complexities and dynamics related to infrastructure, territory, water, power and imaginaries.

The aim of the research is fourfold:

1. Examine the role of imaginaries in relation to infrastructure and related territories, and the way imaginaries act in and through infrastructure.
2. Scrutinize how territories are made and remade through hydraulic infrastructure (and embedded imaginaries, meanings, values and norms) at different historical and infrastructural moments.

3. Draw up a framework that helps to understand hydraulic infrastructure as a force that transforms the relations between space, people and materiality in diverse and contested ways.
4. Generate in-depth critical analysis and empirical insights on the respective issues in Turkey, Peru and Spain.

Research on infrastructure, imaginaries and hydrosocial territories is academically and socially highly relevant. Water concerns us all: it is in our bodies, in our food, in our everyday lives. We are also all embedded in a wide system of water infrastructures; through our consumption of tap water, our showers, the waste and wastewater we produce, the reservoirs where we go for a walk, the food which we consume and which was probably partially produced with water from far-away arid regions, through being citizens of states that are involved in water infrastructure construction at home or abroad. However, despite the omnipresence of hydraulic infrastructures; their workings, uneven effects and embedded norms and morals are often hidden, especially for those not directly or violently affected by them (which I assume is the case for the majority of the readers of this dissertation) (Pinch, 2010). Opening the black box of infrastructure (Pinch, 1992; Winner, 1993) then becomes important to expose embedded worldviews, morals, norms, choices, assumptions and (potentially unequal) power relations in order to make them *bespreekbaar*.[1]

This means that studying hydraulic infrastructures – how and why they come into being, and with what effects for whom – is relevant for society to make these an issue of political discussion, conscious democratic choice and shared decision-making rather than a matter reserved for technical experts or elitist politicians only. Infrastructure studies challenge techno-political dominance and silencing of non-expert voices, having an empowering effect. On a more personal level, I hope that academic and non-academic readers feel invited to ask themselves by which imaginaries, hydraulic infrastructures and territorial transformations they themselves have been shaped and influenced, subsequently taking decisions about how they want to relate to them.

[1] Interestingly I could find neither a suitable English nor German translation for this Dutch adjective. However, I would describe it as 'a state where it becomes possible to speak and discuss about a certain topic', thus breaking with a sort of taboo or veil that covers an issue, question or concern and making it 'conversable'.

Lastly, as I have indicated, water infrastructure projects relate to deeper philosophical and political questions that are societally highly relevant because they are about the essence of our existence, of our personal and societal life, as well as our place as humans in the world. How do we as humans relate to nature? And which role is hydraulic infrastructure to play in this? What would be a 'healthy' or desirable society-nature relationship? How do we want to construct, maintain or deconstruct the numerous hydraulic infrastructures that maintain current consumption patterns and political-material relations? How do we want our territories, livelihoods and living together to look like, and how should we come to decision about this? These questions come back in the different chapters, inviting the reader to make up their own minds about the answers – or at least start wondering about them and potentially engage in actions and discussions in their own, personal hydrosocial territories.

1.2 Research questions

Following from the research objectives is the following central research question:

> **How have contested imaginaries shaped hydraulic infrastructure projects and, in consequence, (re)configured hydrosocial territories in Turkey, Peru and Spain?**

This central question spans the entire dissertation. It is the main guiding question for each of the empirical chapters (Chapter 3 to Chapter 6), as well as for the collection of all chapters together (including the conceptual Chapter 2). In other words, I intend to answer the main question as well as the corresponding sub questions individually for the case studies in Turkey, Peru and Spain; and at the end for all chapters together, elaborating the overall conceptual and empirical insights obtained from the conjoint study in Chapter 7. The different conceptual components of the central research question (that is: hydrosocial territories, hydraulic infrastructure, imaginaries, and the relation between these) are briefly introduced in the next section and then elaborated in detail in Chapter 2. Thereby, the different chapters are connected by both the same overarching research question and common conceptual building blocks. The central research question is operationalized through three sub research questions that each highlight a different aspect of the overarching question.

1. **What imaginaries about hydrosocial territories and hydraulic infrastructures such as dams, water transfers and hydropower plants exist in Turkey, Peru and Spain?**

This question pays particular attention to the content and role of imaginaries in hydraulic infrastructure projects: imaginaries about what hydrosocial territories are, what they should look like in terms of socio-political, economic, ecological and hydrological relations and practices; and the role hydraulic infrastructure is to play in it. The hydraulic infrastructure projects analysed in this research are the construction of a large dam, hydropower plants and water transfers; and the removal of small dams and weirs. I pay particular attention to the imaginaries existing in the minds of concerned actors, which in turn influence project designs and outcomes or the contestations thereof. With 'concerned actors' I refer to those that have a clear stake in the infrastructure and territory at hand. In this research: politicians, project developers, engineers, water authority officials, journalists, beneficiary or negatively affected populations, civil society actors and environmental organisations.

2. How are imaginaries promoted, contested and/or accepted by concerned actors?

This second sub research question studies in how far there is consensus or contestations (or something in between) about imaginaries regarding hydrosocial territories and the role hydraulic infrastructure should play in it. It inquiries about the ways in which different actors try to promote and realize their respective visions, imaginaries and interests through hydraulic infrastructure projects, including an examination of the discursive, economic, social, political and other forms of power they draw on. The focus is thus on *if* and *how* imaginaries are matter of contestations and negotiations.

3. What territorial, material, hydrological and socio-political transformations result from diverging imaginaries, designs and the respective hydraulic infrastructure projects?

The last question asks about materialized designs and effects. How are hydrosocial territories reconfigured through hydraulic infrastructure projects and the inscribed imaginaries? And, what effects do the arising contestations (if any) have in terms of challenging dominant imaginaries, hydraulic designs and the actual implementation and effects of infrastructure projects? Even though this question is about territorial, material, hydrological and socio-political effects, it is not about 'final results'. As I explain in the following section and in Chapter 2, transformations of hydrosocial territories are an ongoing process. Accordingly, this question is about different moments in the history of each case: a temporary 'snapshot' of the transformations that take place as a consequence of hydroterritorial projects.

1.3 Conceptualizing hydrosocial territories, infrastructure and imaginaries

The research questions contain several conceptual thoughts and assumptions about territories, hydraulic infrastructure, the 'hydrosocial', imaginaries, power, effects and transformations. In this section, I therefore briefly introduce these notions and embed them in past and ongoing scholarly discussions. The concepts are further elaborated and extended in Chapter 2. It is important to note that the empirical and conceptual aspects of this thesis have been co-producing each other throughout the research process. This is to say that whereas drafting a conceptual framework formed part of the preparatory stage of the research, this conceptual framework also evolved with observations, analyses and reflections resulting from the empirical field research. In that sense, this research has been an organic, evolving process.

Political ecology of water and power

This research project is deeply embedded in the tradition of political ecology. Political ecology is a broad field of inquiry that has produced an immense body of diverse studies, questions and understandings in the last decades. It originated as a critique of apolitical ecology and other sciences that claim a simplistic 'objectivism' and 'truth', and calls for a critical re-thinking of relations between society and the environment (Bridge et al., 2015). More specifically, it promotes an understanding of society and the environment as inseparable, and sets out to "unravel the political forces at work in environmental access, management and transformation" (Robbins, 2012: 3). Thus, political ecology and therewith the political ecology of water is all about 'the political': the nature of politics as well as the political in humans' thinking of and dealing with nature. There is explicit attention to how unequal power relations produce certain environments and water governance arrangements, and how that in turn reproduces socio-economic inequalities, misrecognition and political exclusion that affect especially marginalized groups (Boelens et al., 2016). Political ecology is therefore also a normative political commitment to environmental and water justice (Perreault, 2014; Schlosberg, 2004; Zwarteveen & Boelens, 2014), to unravelling unequal power relations and foregrounding the struggles and interests of marginalized groups, to contest single stories (Ngozi Adichie, 2009) and 'objective truths', to contribute to creating alternatives (Perreault et al., 2015; Robbins, 2012).

Against this background, hydraulic infrastructure and territorial transformations are understood as profoundly political, and power as central. My conceptualisation

of power has been much inspired by Foucault's work. One of the central aspects in Foucauldian thinking is that power "is not something that can be divided between those that have it and hold on to it exclusively" (Foucault, 2003: 3 cited in Ekers & Loftus, 2008: 705) but that it is rather a force or quality that circulates in and through relations among different agents. This means that power emanates from diverse sources and in diverse forms (Pickett, 1996). It is therefore crucial to not only see the 'usual' forms of power (that is, coercive or legal power or, in Foucault's terms, sovereign power), but also the subtle forms of disciplinary and capillary power that work to 'conduct the conduct' through regimes of truth and internalized norms, habits, aspirations and beliefs (Foucault, 1975, 1991). This power is often less visible; it works from 'within' and is precisely therefore extremely effective (Foucault, 1975, 1978; cf. Boelens, 2015). For this research, these considerations about power imply an attention to scrutinizing and unravelling discourses, epistemologies, and processes of subjectification that are at play in hydraulic infrastructure projects and territorial transformations.

Hydrosocial territories

A central notion of this research is 'hydrosocial territories'. It is a notion that links to two strands of scholarly discussion: those related to territory in political geography scholarship and those related to the coproduction of society and water ('the hydrosocial') in water governance scholarship. In political geography, thinking about territory has a long tradition and was originally associated with studies about the nation state and spatial 'state-making' within national boundaries (cf. Elden, 2010, 2013). However, the concept has substantially evolved since then, now encompassing more generally the study of power relations, governance and rule-making within a specific space and time. As Antonsich (2011: 425) states, territory is no longer understood as "a socially disempowering technical devise, but the sociospatial context where the 'living together' is produced, organized and negotiated". Drawing on Antonsich and several others (for example Agnew and Oslender, 2013; Brighenti, 2010; Raffestin, 2012), in my understanding then territory can be defined as *the socio-environmental materializations of spatially grounded networks of actors, artefacts and the environment; and their respective meanings, relations, interactions and actions* (cf. Boelens et al., 2016). This implies that territory is spatial and material, but also importantly relational and political. Relational because materialities and territorialization (the making of territory) are shaped through patterns of human and nonhuman relations (Brighenti, 2010). Political because the definition of these patterns of relations and thereby territory happens through the negotiations between, and enactment of, power relations. Also vice versa, control over (or a privileged position in) territorial patterning serves as a source of

power (Clare et al., 2018; Delaney, 2009; Sandoval et al., 2017; Suhardiman et al., 2019). Connecting these considerations to a focus on water and water governance gives origin to the notion of hydrosocial territories. This concept has emerged and been increasingly used since 2015 as a way to understand how networked relations between actors, artefacts and the environment produce particular territories (Duarte-Abadía & Boelens, 2016; Götz & Middleton, 2020; Mills-Novoa et al., 2020). It substantially builds forth on other concepts advanced among water scholars, in particular those of 'waterscape' (Baviskar, 2007; Budds & Hinojosa, 2012; Karpouzoglou & Vij, 2017; Perreault et al., 2012; Swyngedouw, 1999) and the 'hydrosocial cycle' (Linton & Budds, 2014; Mollinga, 2014; Swyngedouw, 2009). Both draw attention to the coproduction of water and society, and break away from the long practiced separation of both. In the notion of waterscapes, the attention is specifically on the material and spatial effects produced by hydrosocial relations, actions and interactions. As Budds and Hinojosa (2012: 124) state, it serves to "explore the ways in which flows of water, power and capital converge to produce uneven socioecological arrangements over space and time, the particular characteristics of which reflect the power relations that shaped their production" (cf. Perreault et al., 2012).

The notion of hydrosocial territories adds a specific focus on the dynamic, interactional and plural nature of hydrosocial relations and their materializations, as well as to the role of imaginaries and 'imagined' rather than only material territories (Hommes et al., 2018). Besides, there is more explicit attention to governmentalities, so how space and relations are ordered through diverse techniques of government including the earlier mentioned capillary powers that aim to form subjects (Foucault, 1991; cf. Swyngedouw & Boelens, 2018). In this dissertation, I borrow as a working definition that of Boelens et al. (2016: 2) who define hydrosocial territories as *"the contested imaginary and socio-environmental materialization of a spatially bound multi-scalar network in which humans, water flows, ecological relations, hydraulic infrastructure, financial means, legal-administrative arrangements and cultural institutions and practices are interactively defined, aligned and mobilized through epistemological belief systems, political hierarchies and naturalizing discourses"*.

From this definition and in the context of the earlier stated research question, the question then arises how to understand the making of hydrosocial territory. Many pages can be written about this. What is central for this research is the assumption that territorialization is a process shaped by power. As indicated above, power herein can take multiple forms: from overt force, laws and policies to discourses, narratives and

imaginaries. Diverse forms and workings of power are differently highlighted in the empirical chapters of this dissertation, sometimes focusing specifically on Foucault's governmentalities (Foucault, 1991, 2008) (Chapter 3), at other times putting more emphasis on the power of imaginaries (Chapters 4), or political, legal and financial powers (Chapter 5). In any case, it is central to realize that I understand the making of hydrosocial territories as a contested process in which power thus forms and reforms hydrosocial relations and realities. It is contested because, in a specific time and space, different actors have diverging ideas about what hydrosocial relations should look like, each trying to materialize their respective ideas and interests in spatial-material as well as political-institutional arrangements and patterns (Duarte-Abadía & Boelens, 2016; Götz & Middleton, 2020; Lynch, 2012; Seemann, 2016). These overlapping ideas about what a specific hydrosocial territory is and what it should be, also open up the possibility for territorial pluralism (Hoogesteger et al., 2016). This means that, in the same geographical space, there can be partially overlying or contradicting hydrosocial territories, each with their own particular rules, meanings attached to water or territory, and visions about desirable futures. Thinking in terms of territorial pluralism or territories-in-territory allows to conceptually entangle the multiple power relations and power struggles at play when it comes to envisioning and materializing hydrosocial realities.

Finally, the outcomes of territorialization efforts and power struggles are open-ended and unforeseeable, meaning that the reconfiguration of hydrosocial territories is never finished, can change through shifts in the hydrosocial networks and often takes directions that cannot be foreseen by any planner, politician or sociologist. Therefore, this research does not intend to establish final outcomes of hydrosocial projects but rather shed light on past and ongoing transformations.

Infrastructure

Hydraulic infrastructure is taken as the starting point in each of the case studies, asking specifically about the imaginaries embedded in infrastructural projects, the way these projects become realized and the effects they generate in terms of hydrosocial territorial transformations. Within this question framing, hydraulic infrastructure is a central node in hydrosocial territories, which has the power to materialize hydrosocial and political imaginaries in concrete materialities and to transform territories, relations and practices entirely. My focus is specifically on *modern* infrastructure, so those works constructed in the modern period that had its origins in the scientific revolution of the 16th and 17th century. Modernity and the associated infrastructure are generally

characterized by a strong belief in continued linear progress, the plannability of social order and living, and the central role of science and technology (Kaika, 2006; Oliver, 2000; Teisch, 2011).

In general terms, hydraulic infrastructure has been the object of study in different disciplines, from engineering and agricultural sciences to anthropology and science and technology studies (STS). I have been particularly inspired by the latter (Callon, 1989; Latour, 2000; Latour & Venn, 2002; Pfaffenberger, 1988; Pinch, 1992; Pinch & Bijker, 1984; Winner, 1980, 1993). However, interestingly, despite of the wide arrange of studies about infrastructure, there is no univocal definition. Harvey, Jensen and Morita (2017) even sustain that "a definitive definition of infrastructure remains elusive […] [and] conceptually and empirically counter-productive" (Harvey et al., 2017: 5). They nevertheless give it a try saying that "infrastructures are extended material assemblages that generate effects and structure social relations, either through engineered (i.e. planned and purposefully crafted) or non-engineered (i.e. unplanned and emergent) activities" (Harvey et al., 2017: 5). In a similar manner, Appel et al. (2018: 3) state that "material infrastructures […] are dense social, material, aesthetic, and political formations that are critical both to differentiated experiences of everyday life and to expectations of the future". From these definitions a few defining characteristics of infrastructures come forth, which together have informed my own conceptualization.

First, infrastructures are material structures (in this thesis: large and small dams, hydro-power plants, water transfers, tunnels, canals and weirs) in their most obvious essence and appearance. At the same time, they are also much more. Specifically (and this is the second characteristic), infrastructures need to be understood as political, relational and multiple. They are embedded in legal frameworks, technical knowledge, political projects, world views, morals, ideology, imagination, environments and everyday practices (Callon, 1989; Harvey et al., 2017; Jensen & Morita, 2017; Verbeek, 2011; Winner, 1980). With 'embedded' I mean that they come forth, are sustained by and in turn also influence and shape these elements and their relations. In that sense they are also 'multiple': being an assemblage of various material, institutional, socio-political and imaginary aspects.

Third, similar to Jensen and Morita's view of infrastructure as "open-ended experimental systems" (Jensen & Morita, 2017: 3), I understand infrastructures as dynamic, always-in-the-making. Even though infrastructures can mean a materialization of specific imaginaries, worldviews or power relations, this materialization or 'fix' is potentially

challengeable or can take unexpected directions. For example, infrastructures can be technically modified, the discourses or myth surrounding them can be challenged, or connected political relations and thus use agreements and distributive arrangements can change (Gupta, 2018; Kemerink-Seyoum et al., 2019; Pfaffenberger, 1992). At the same time, as Carse and Kneas (2019: 13) state, we nevertheless need to pay attention to the ways in which "the possibility of finishedness (as an idea or ideal) shapes how people think about, talk about, and act with regard to [infrastructural] projects". The delicate relation between (the envisaged or actually lived) materiality or finishedness of infrastructure on the one hand, and dynamism and possibilities for contestations and adjustments (or "socio-technical tinkering" in the words of Kemerink-Seyoum et al. (2019: 4), see also Hidalgo-Bastidas and Boelens (2019)) on the other hand, is a recurring issue throughout this thesis. It is, furthermore, an issue that is particularly interesting and important in the case of hydraulic infrastructure as opposed to other infrastructures. This is due to the characteristics and specifically the unpredictability of water and nature (floods and droughts, soil erosion and sedimentation, etc.), the intrinsic properties of hydraulic infrastructure in use (wear and tear), and the dynamic social system that controls and uses the infrastructure and related water flows (Bolding et al., 1995; Veldwisch et al., 2009). Opening up the analysis to the unsteady relation between fixity and dynamism also indicates that I see hydraulic infrastructures as incredibly powerful to reconfigure hydrosocial territories and all that this entails, without elevating them to be an omnipotent, all-powerful, unchangeable force.

Imaginaries

The last notion that forms part of the conceptual framework of this thesis is imaginaries. Scholarly inquiry about imaginaries has a long history in political ecology as well as human geography (Davoudi & Machen, 2021). Influential works include, amongst others, Edward Said's *Orientalism* (1978) and Benedict Anderson's *Imagined Communities* (1983). In the former, Said analyses how western scholars have constructed an 'imaginative geography' of the East, attributing simplified, romanticized and exotic characteristics to this immensely diverse geographic space. He argued, furthermore, that it was this imaginative geography that drew boundaries between an 'us' and a 'them' that reflected and further enforced racism, and served as a justification for colonialism. Through drawing this connection between imaginaries and colonialism, Said importantly showed how imaginaries have political and material consequences. Connecting to Said's argument, a few years later, Anderson promulgated the idea of the modern nation state as an imagined political community. He deconstructed how people who do not know each other are bounded together in comradeship and

a common imagined history, beliefs and attitudes through the idea of a nation and being citizens of that nation (Anderson, 1983).

Said, Anderson and others have inspired scholars across disciplines (see for example Derek, 1994; Jepsen, 2017; Jessop, 2010; Rundell, 2016; Steger & James, 2013; Taylor, 2004). In the field of science and technology studies, it is specifically Sheila Jasanoff and Sang-Hyun Kim who have taken up the discussions and shaped the term 'sociotechnical imaginaries' (Jasanoff & Kim, 2015). In the introduction to the edited volume *Dreamscapes of Modernity*, Jasanoff defines sociotechnical imaginaries as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015a: 4).

Following up on this, in this dissertation imaginaries are – simply put – defined as *societally and institutionally established visions about what is and what ought to be*. This includes imaginaries about how lives should be lived and how political, social, material, hydrological and ecological relations should be ordered; and about how such desirable futures should be realized. Imaginaries are thus descriptive as well as prescriptive and contain, amongst others, normative statements about morality (Latour & Venn, 2002; Shah & Boelens, 2021; Taylor, 2004; Verbeek, 2011). In the context of hydrosocial territories and hydraulic infrastructure, imaginaries are part and parcel of socio-territorial relations and realities as well as infrastructure projects. They can be the interpretation of present day relations, the basis and supportive apparatus for infrastructural projects, and/or a powerful technique to either reinforce or contest existing hydrosocial orders.

Crucially, imaginaries have concrete effects for materialities, subjectivities and relations, being enacted and re-enacted through hydraulic infrastructure, institutions, relations and discourses (Harvey, 1990). However, only those imaginaries that are enmeshed with power such as institutional, political and financial power to just name a few, actually become performative, truthful and 'effective'. This means that when studying imaginaries, it is not only relevant to scrutinize their content but also how they are promoted, contested and/or accepted by concerned actors through different forms of power, becoming eventually materialized (or not) in hydraulic infrastructure and territorial transformations. Studying territorial transformations with the notion of imaginaries allows to pay particular attention to "the capacity of individuals and

groups to see and think differently", to "follow the embedding of ideas into cultures, institutions and materialities" (Jasanoff, 2015b: 323), and to understand the contested nature of both materialities and the imaginative.

Conceptual contributions of this research

This research is inspired by and embedded in the scholarly traditions and discussions outlined above. However, it also advances them both in conceptual and empirical terms by drawing them together into a framework that is further introduced in Chapter 2. The contribution is threefold. First, in water governance scholarship there has so far been little explicit attention to imaginaries and how they change with time and in relation to hydraulic infrastructure. In infrastructure studies in general, many scholars have done important groundwork to show how infrastructure construction always involves an act of 'futuring' (i.e. imagining and envisioning futures) (Fry & Murphy, 2021; Gandy, 2014; Gupta, 2018; Krause, 2015; Perreault et al., 2018; Steger & James, 2013; Swyngedouw, 2013). This research now puts different kinds of imaginaries (not only those about the future) and their changing role and content with regards to hydraulic infrastructure and territorial transformations central. Second, even though infrastructure's agential role has been observed by some (see for example Loftus, 2016; Meehan, 2014; Verbeek, 2005), the exact effects it has in terms of engendering and structuring power relations and hydrosocial territories often remain rather implicit. Through combining insights about infrastructure, hydrosocial territories, imaginaries and subjectivities, I hope to provide a comprehensive framework that can help to better grasp and foreground the multiple complexities and relations within and between infrastructure and territorial transformations. Third, conversations between infrastructure creation (e.g. dam construction) and infrastructure removal (e.g. dam removal) have been largely absent from scholarly discussions. There are many studies focused on dam construction and the contestations this sparks (see for example Del Bene et al., 2018; McCully, 2001; Shah et al., 2019; Suhardiman & Karki, 2019) and also an increasing number of studies on dam removal (for example Brewitt, 2019; Brummer et al., 2017; Magilligan et al., 2017; Sneddon et al., 2017). However, to my knowledge there is none in the realm of political ecology that sets both construction and removal dynamics alongside each other, as I intend to do in the later part of this dissertation.

1.4 Notes on positionality

Before elaborating on the research methodology in detail, I want to start with some notes on positionality. Even though reflections on positionality often come in second place – as a kind of annex – I believe that my methodological and conceptual choices have been deeply influenced by my positionality and my life that evolved while doing the PhD, and cannot be explained isolated. It was my passion for water – which developed rather by coincidence during my undergraduate studies – as well as my fascination for discovering new things, for asking questions to only find more questions rather than clear-cut answers; that inspired me to embark on this research journey in the first place. My focus on the political and justice-related aspects of water affairs then was an almost automatic choice that came with it, stemming from my long-existing interest in conflicts, justice and equity. I am doubting if I can pin down where this interest comes from, but I realize now that discovering about the horrors of World War II brought about by Nazi Germany impacted me a lot. As a German born in 1990, I am the granddaughter of grandparents who lived and acted in one way or the other in Hitler Germany. I am also a citizen and descendant of a nation that not so long ago committed atrocities so horrific (and horrifically embedded in society and daily life back then), that I could only feel deeply shocked, disgusted and ashamed when I started to learn in detail about the Third Reich at a young age. Besides feeling ashamed of being German for a long time, this process of (self)discovery also led me to ask questions about my family's role in the War (and vice versa, the War's role in my family) and ask myself what I would have done if I would have lived during Hitler's time. Would I have been enchanted by his powerful speeches and promises? Would I have closed my eyes and looked the other way? Or would I have resisted, through subtle every day resistance or organized underground resistance? These very personal reflections led me to an interest in questions of resistance in Germany and beyond: for example, at the age of 14 writing a high school essay about Sophie Scholl, a few years later a paper on Martin Luther King, and my final high school assignment about the Stolen Generation of indigenous Australians. I was deeply fascinated and immensely admired these people who had sacrificed their lives for justice and equality. I felt incredibly thankful for them, their voices, actions and courage. These thoughts, examinations and admirations during my high school years were crucially formative for my interest in questions about (in)justice, power, dominance and resistance.

When I look at the research questions I have asked about water, territories and infra-structure in this PhD project, it becomes clear that this focus on struggles and justice

is still very much present. In the previous section, I have conceptualized hydrosocial territories and imaginaries as always evolving, as always contested. I am deeply convinced of this but at the same time aware that it is also a political positioning that has to do with my vision of the world. It is a vision of the world where conflict is present in different forms at all levels, and where I as a researcher want to contribute to uncovering some of the unequal power relations with the hope that visibility can help to make steps towards a better situation, particularly for the most vulnerable groups. Especially concerning hydraulic infrastructure, uncovering underlying discriminatory mechanisms and implications is highly relevant because it is exactly these most visible materialities of infrastructure (or other technological artefacts for that matter) that often effectively hide unequal power relations.

In terms of methodology, I will explain in the following how the three case studies of this research help to shed insights on processes of territorialisation, hydraulic infrastructure and imaginaries. Each of them fulfils a different function and provides valuable insights in itself, and furthermore contributes to a valuable cross-case pollination. At the same time, the choice for these cases has been a personal one. This thesis is thus not the outcome of a drafted and then executed research plan. Turkey as a country and especially the Turkish-Kurdish conflict deeply touched me during my exchange semester in Istanbul and after visiting friends in the unofficial Kurdish capital Diyarbakir in southeastern Turkey and realizing that all their families had personally suffered in the decades-old conflict. This then led me to do research on the Ilısu Dam, which is closely connected to the Kurdish question. After then not being able to continue with this research because of a deteriorating political situation in the country in which it did not feel safe to conduct critical research, I searched for other opportunities and by coincidence ended up in Peru, where I subsequently spent living for more than four years. Hence the case study of Lima's infrastructural systems. After those years in Peru, I returned to The Netherlands and wanted a new regional and also thematic focus. Even though infrastructure construction will always fascinate me, I was intrigued by the novel trend of dam removal. I started wondering how that fitted with my previous focus on pre-construction discussions and post-construction impact. I had no answer but was captivated and wanted to find out more, so I decided to focus the last part of the research on dam removal in Spain. Spain, because it is a fascinating country for studying infrastructure imaginaries and debates as society, water policies and hydraulic infrastructure have been profoundly shaped by utopian hydraulic imaginaries that resulted in massive dam building since the late 19th century (Swyngedouw, 1999; Swyngedouw & Boelens, 2018). And second, because I wanted to continue speaking

Spanish and saw Spain as a potential next destination for living. The selection of case studies was thus enmeshed with coincidences, personal choices and interests, as well as opportunities that presented themselves.

The methodology of this research is thus far from a 'purely academic' or technical one (if such thing exists at all). It is an honest recognition of the deep and inevitable enmeshment between me as a researcher and the topics and contexts I study, and makes explicit how knowledge is produced in very personal ways. This approach relates to currently unfolding methodological discussions among scholars of anthropology and ethnography, amongst others, that question the traditional separation between "the field/the research" and "home/the researcher" and call for a rethinking of field work (Günel et al., 2020). Furthermore, the methods, thorough analysis, a conceptual framework and analytical engagement with the three case studies in this doctoral research, make it a rigorous academic work. More so, while the choice of the case studies was related to my personal life and positionality, their combined study is highly valuable in several ways as I explain in the following section. At the end of this dissertation in Chapter 7, I will again come back to this enmeshment of the research and the researcher and reflect on how both evolved together, bringing about new inquiries, insights and (personal and intellectual) developments. Connected to that, the quotes at the beginning of each chapter are a reflection of how my research journey seeped into different spheres of my life: topics of my research at times seemed to 'haunt' me as I could suddenly relate parts of my free time amusement such as movies, TED talks, novels and other texts to them – as if my eyes had changed. These alternative sources inspired me to rethink my observations and insights on infrastructure lives and territorial transformations and, at the same time, made me ever more conscious about the connection of this research to broader societal discussions. What is presented at the beginning of the chapters is only a selection.

1.5 Research methodology

1.5.1 General research setup

Hydrosocial territories are singular among contexts and times. Even in the same moment and space, overlapping and potentially contradictory territorialities can co-exist as reflected in the notion of territorial pluralism (Hoogesteger et al., 2016). An in-depth study and thick description of different cases is then a meaningful way to inquire about hydrosocial territories' uniqueness and place-specific particularities on the one

hand, and possibly similar dynamics and place-crossing phenomena on the other hand. It thereby allows to understand a part of the complexity of territorialisation processes that emerge around hydraulic infrastructure.

As Lazar (2012) argues, setting cases with dissimilar characteristics next to each other and seeing what comes out of their examination – individually and together – is a meaningful way to raise new questions, challenge assumptions, bring together different perspectives on the research topic, and inform and further develop conceptual notions through reflexive engagement with the case studies. This is what this research aims to do through engaging with three dissimilar cases that are tied together through the existence of hydraulic infrastructure and related territorial transformations, but that also reflect my own personal and intellectual journey. This methodology did indeed help to raise new inquiries, question assumptions and organically develop conceptual notions. For example, studying discussions about dam removal in Spain made me question assumptions of general local resistance *against* dams and raise provocative questions about parallels between dam construction and dam removal. Also, the conceptual framework that I sketch in Chapter 2 of this dissertation has been gradually developed and continuously enriched by the singularities as well as certain similarities that I saw within and between case studies. In that sense, the study of three cases allows to cover a broad range of issues and processes which cannot be found in one single case but which are necessary to understand the changing nature of imaginaries, infrastructures and territories. This does neither lead to generalizing conclusions nor to a complete picture of all territorial transformations associated with hydraulic infrastructure, but it illuminates details and examples of the interplays between water infrastructure, imaginaries and territories. In the concluding chapter of this dissertation I further work out some of the insights, questions and (re)consideration that were sparked by this methodology of incomparable, thick descriptions.

In the end, each of the case studies contributes a little piece to the bigger picture. Each sheds light on a different infrastructure, a different infrastructural moment, different imaginaries and materialized impacts as shaped by the respective socio-political context and its moment in time. Their characteristics are depicted in Table 1. Nevertheless, I am aware that the characteristics and foci of analysis could have perhaps also been found in other case studies from Asia, Africa, or other parts of the world. However, their relation to myself as a person and to myself as a researcher with specific language skills, networks, (albeit limited) cultural knowledge and experiences – all prerequisites for a meaningful research project – made their selection suitable and valuable.

Table 1 Overview of case study characteristics

Country	Type of infrastructure	Infrastructural moment (focus of analysis)	Sociotechnical imaginaries (focus of analysis)
Turkey	Large-scale hydropower dam	Pre-construction hydraulic and territorial design discussions	Pluralities of imaginaries (with divergent, unequal power bases) about the same infrastructure and its (non-)implementation
Peru	Rural-urban water transfers and small hydropower plants	Construction (historic analysis), impacts of infrastructure existence, re-negotiation of construction past	Domestication of nature through hydraulic infrastructure to reach progress and modernity
Spain	Small dams and river weirs	Removal	Disputes between old and new dam and river imaginaries

1.5.2 Research methods

The overall research approach was inspired by technography, which is an interdisciplinary, interrelating analysis of infrastructure, nature and society (Jansen & Vellema, 2011). It studies the concrete shaping, use and impact of technologies, and in this case specifically hydraulic infrastructure, in social situations and how they (re)configure territories and create specific water access and control arrangements. Technography as a research approach requires diverse methods that aim to historically, physically and discursively follow water and infrastructure through its materiality and relations to humans and nonhumans.[2] This approach allows me to shed light on how hydrosocial territories are reconfigured by the interaction between imaginaries, actor alliances, biophysical and symbolic-cultural environments, and infrastructure in different moments of time.

[2] I use the notion of nonhumans as an umbrella term to refer to those beings and entities that are not human but that nevertheless possess some form of agency in processes of territorial transformations, including for example infrastructures and other material structures, animals, environmental phenomena, and tools and technical artefacts (Callon, 1986; Latour, 1992, 1993, 2005; Sayes, 2014).

The methods I used were literature review, semi-structured interviews, field observations, media discourse analysis, and archival research. In the cases of the Ilısu Dam and dam removal in Spain, desk and online research predominated, complemented by short field visits (to Istanbul, Turkey and to the community of Olba, Spain respectively). In the case of Lima, I conduced in total 7 months of field research, including multiple field visits, more than 60 interviews with diverse stakeholders and extensive archival research in Lima. Thus, the methodology and methods vary between the three case studies. They were always adapted to the current political situation (including the deteriorating political situation in Turkey and the worldwide pandemic) as well as the availability and accessibility of information sources and contacts. Further details about the research methods used for each case study and a complete list of interviews can be found in Annex 1. Throughout this dissertation, references to interviews are provided in footnotes; references to published literature are given in short form between brackets and in full at the at the end of the dissertation. To ensure confidentiality of interviewees, I never state their real names but only refer to their role and institution.

During the research I have adhered to recognised research ethics for social sciences (KNAW et al., 2018; National Ethics Council for Social and Behavioural Sciences, 2018) such as transparency about the purpose of research and intended use of results, obtaining of research participants' free and informed consent, safe storage of primary research data, and precaution to prevent unintended and undesirable consequences of the research. For example, at times I detained from asking certain questions that could potentially cause new, or stir up old, conflicts in the case study sites. At the same time, I was always transparent about my own positionality, but nevertheless tried to remain as open as possible to different viewpoints and unexpected research outcomes. Lastly, the diverse publications that resulted from the research were always guided by integrity, substantiated conclusions and explicit recognition of uncertainties or contradictions.

1.5.3. The regional context of the case studies

Ilısu Dam, Turkey

Turkey is a country in a unique geographical position, situated between continental Europe and continental Asia. With an area of almost 800.000 km^2 (in comparison: the Netherlands has 41.543 km^2), it spans a diverse range of climatic zones. Politically, Turkey is a relatively new nation, founded by Mustafa Kemal Atatürk after the collapse of the Ottoman Empire in 1923 as a nationalist, secular, parliamentary democracy. Since then, it has been characterized by turbulent politics: with a period of one-party rule under the 'Father of the Turks' Atatürk, and different military putsches in the 1960s and 1980s.

Since 2002, it is ruled by the Justice and Development Party (AKP in its Turkish acronym, *Adalet ve Kalkınma Partisi*) under the leadership of prime minister Recep Tayyip Erdoğan (Dewdney, 2021).

The Ilısu Dam is situated in the southeastern region, close to the boarders between Turkey and Syria and Iraq. Due to its mainly Kurdish population, who make up around 19% of the entire population living within Turkish national boundaries (Dewdney, 2021), this region has long been shaped by the Turkish-Kurdish conflict. This conflict dates back to the establishment of the Republic of Turkey: while Turks and Kurds had been fighting side by side during the War of Independence (1919 – 1923) and Kurds had been promised autonomy, the newly established state immediately embarked on a policy of homogenization based on ethnic Turkish identity (Zürcher, 2004). Other ethnic groups and identities were supressed, which sparked Kurdish rebellions that were all violently put down by Turkish military forces.

It was not until the 1960s that Kurdish nationalism was reborn again after Turkey's political system was opened up to multi-party participation through a military coup. While the 1960s were characterized by populist demonstrations demanding more civic and social rights, the Kurdish movement became more leftist and more radicalized in the course of the 1970s. In 1978 the Kurdistan Workers Party or PKK (*Partiya Karkerên Kurdistan*) was established who, in 1984 entered into violent conflict with the Turkish state. Following were years of violence, military clashes between Turkish forces and PKK guerrilla fighters, terrorist acts by the PKK and an enormous number of internally displaced people. Even though there were periods of fragile cease fire (for example between 2013 and 2015), at the moment there is again violent fighting between the PKK and the Turkish military in northern Iraq and, to a lesser degree, in northern Syria and southeastern Turkey (all Kurdish regions) (International Crisis Group, 2021). Also beyond military confrontations, the Turkish-Kurdish conflict remains unresolved.

This context is of high relevance for the Ilısu Dam, because of its location and its implications as I analyse in Chapter 3. The Ilısu Dam forms part of the regional infra-structure and development project GAP (*Güneydoğu Anadolu Projesi*, Southeastern Anatolia Project). GAP was initially planned in the 1970s and envisaged the construction of 22 dams, 19 hydropower plants (HPP) and massive investments in large-scale irrigation to water 1.8 million ha of land (Bilgen, 2020; GAP, 2014). The initial technical focus was later extended to issues such as education, health care and telecommunication, transforming GAP into an integral development project (Özok-Gündoğan, 2005).

The Ilısu Dam is the biggest dam of GAP, 135 meter high and 1820 meter long (see Figure 1, the Ilısu Dam is located in the lower right corner) (Setton & Drillisch, 2006). Its reservoir's storage capacity is 10,410 hm^3 and the connected hydropower plant has an installed capacity of 1,200 MW (GAP, 2014). It is located on the upper stretch of the transboundary Tigris River some 50 km away from the boarder with Syria and Iraq. Initial plans were formulated in the 1950s but it was only in 1982 that a project design was made. Due to changing construction consortia, financing difficulties, massive protests against the dam plans nationally and abroad, and acts of sabotage at the construction site, it took another three decades for the dam to be finally finished in 2018 and start operation in 2019. In 2020, the raising reservoir waters flooded the ancient town of Hasankeyf, which has been central in earlier anti-dam mobilizations. Since its conception, the dam was heavily controversial and criticized by many different Kurdish and non-Kurdish, national and international groups.

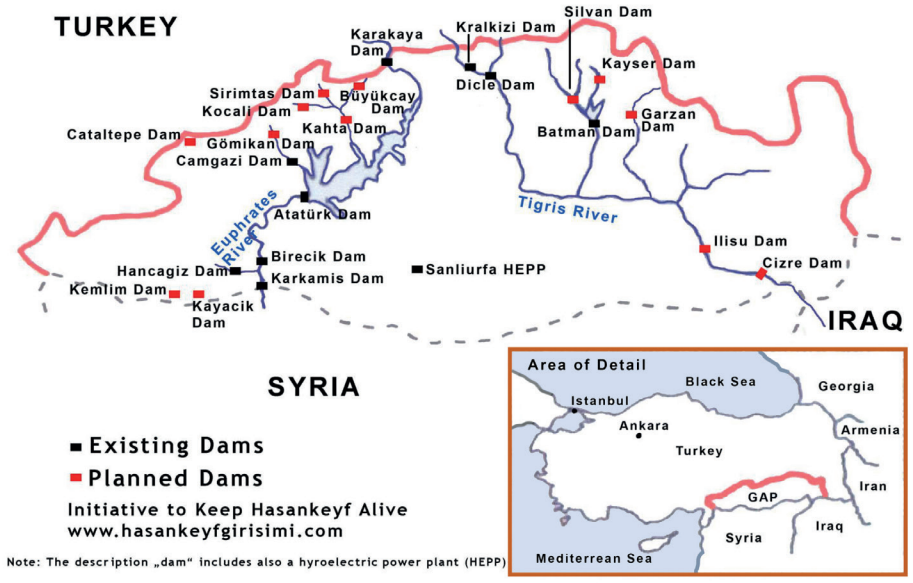


Figure 1 Locations of existing and planned dams and hydroelectric power plants of GAP (adapted from Initiative to Keep Hasankeyf Alive, 2015)

In the analysis provided in Chapter 3, I show how different stakeholders construct specific socionatural imaginaries to justify or contest the construction of the Ilısu Dam, according to their backgrounds and interests. I scrutinize the arguments of the Turkish government in favour of dam construction, paying particular attention to how different governmentalities are mobilized and sustained by an inclusive discourse portraying the dam as a symbol of national pride. This inclusive discourse is embedded in cultural politics that disregard the region's (Kurdish) ethnic make-up and aim to de-politicise the dam project. Through this analysis, I show how the realization of dam (and other infrastructure) projects is not purely about governing water but also about governing people through implanting new meanings, values, and distribution and rule-making patterns onto local territories. However, I also examine how the dominant hydrosocial dam imaginary is contested by different stakeholders that dynamically build multi-actor, multi-issue and multi-scale coalitions. I focus on the involvement of the Kurdish community who see the dam as an assault on Kurdish history and culture, and on the subsequent involvement of national and international environmental NGOs that allied with Kurdish groups but importantly shifted the focus of the anti-dam campaign to the dam's anticipated negative environmental impacts. This helps me to make a broader point about how the multi-dimensionality of a mega project such as the Ilısu Dam unites actors from different background under a common goal, while at the same time each actor embeds the anti-dam protest in their broader campaigns and respective underlying interests, views and positions.

Rural-urban water transfers and hydropower plants Lima, Peru

Lima is Peru's capital, located on the desert coast of the South Pacific. The city currently has almost 11 million inhabitants which accounts to about a third of Peru's total population. It is also the country's economic and political centre, hosting the most important companies, industrial complexes and all national ministries. Peru is geographically divided by the Andean mountain range, which transverses the country from North to South and divides it into a small strip of desert coast with relatively short rivers that drain into the Pacific Ocean, and bigger and longer rivers that eventually drain into the Amazon basin and the Atlantic Ocean.

There are three rivers in and around Lima: the Chillón River in the northern suburbs, the Rímac River with the important sub watershed of the Santa Eulalia River, and the Lurín River in the South. There are drinking water treatment plants on the Chillón and Rímac Rivers, whereas most part of the Lurín River is used for agricultural purposes. The focus of this research is specifically on the Rímac River and its tributary Santa Eulalia, as these

two have been on the centre stage of infrastructure development for urban water and hydropower supply.

The Rímac watershed is formed by the confluence of the San Mateo and the Santa Eulalia rivers and has a total extent of 3503 km^2 with a river course length of 127 km (see Figure 2 for an overview of all relevant watersheds and main infrastructures) (Autoridad Nacional del Agua, 2010). The watershed's geography is highly varied. The upper watershed has steep mountain slopes, 145 lakes and wetlands. It is characterized by heavy rainfalls especially from December to March, with an average annual precipitation of 385 mm (Autoridad Nacional del Agua, 2018). The lower part is a coastal desert area with an average yearly precipitation of 9 mm. The heavy rains in the upper and middle watershed are the main water source feeding the Rímac River and lake system. The annual average flow rate in the lower watershed, before the intake of Lima's drinking water company, is 28 m^3 per second but varies significantly between wet and dry months (Autoridad Nacional del Agua, 2010; SENHAMI, 2014). The river and highland lake system have been heavily modified by human intervention. Hydropower development led to the damming of highland lakes and water transfers from the Atlantic Mantaro watershed to the Santa Eulalia sub watershed substantially modified river flows (Vega et al., 2015).

Politically, the Rímac watershed belongs to the department of Lima and the provinces of Lima and Huarochirí. Water users are diverse. In the upper and middle watershed there are numerous small peasant communities whose livelihoods are mainly based on agriculture and livestock breeding. Natural pasture areas are rainfed, whereas agricultural areas (an estimated 11,272 ha) are irrigated from highland lakes, mountain streams and direct water intakes from the Rímac and Santa Eulalia rivers (SEDAPAL, 2014). There are also mining operations in the upper watershed that pose a constant threat to water quality due to toxic mining tailings (Autoridad Nacional del Agua, 2010, 2018).

At the time of research, there were seven hydropower plants (HPPs) in the Rímac watershed with two more planned. Together they have a production capacity of 662 MW. Five of the seven HPPs were constructed between 1938 and 1965, and are currently owned by Italian multinational Enel. The two newer HPPs were constructed by mining companies to produce electricity for their operations throughout Peru. They return water flows to the riverbed after a few kilometres, whereas Enel's HPPs are connected by underground tunnels conducting water from one HPP to the next.

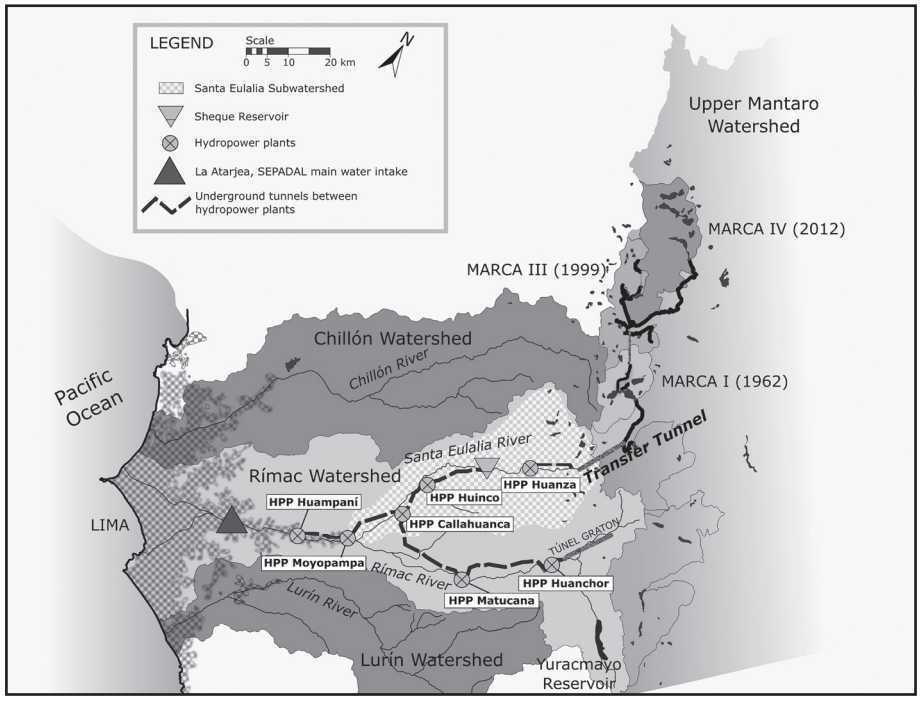


Figure 2 Watersheds and infrastructures in the Lima region (Hommes & Boelens, 2017: 73)

The Rímac watershed figures prominently in debates about water supply for the megacity of Lima, as the majority of the city's inhabitants receive their drinking water from this watershed and the trans-Andean water transfers from the Mantaro watershed. Chapters 4 and 5 focus on the historic development of the infrastructure complex, the enduring water use arrangements resulting from it and current dynamics that are characterized by a re-remembering of the past. First, I unpack how the successive construction of the HPPs and the connected hydraulic infrastructure system is a materialization of historic aspirations of modernity, progress, urbanization and electrification. I demonstrate how in particular imaginaries about the domination and 'development' of water and people through hydraulic engineering have been central. Second, I analyse how the step-by-step acquisition of control over upstream water resources by hydropower companies and later Lima's drinking water utility continuously changed water flows, water control arrangements and the position of diverse water user groups in ambiguous ways. The infrastructure entangles territories

and connects distant places in a relationship of interdependence, also pointing to how urbanization is a symbolic, social, material and multi-scalar endeavour that crosses conventional city boundaries and entwines the rural and the urban in a shared history. Third, the chapters about Lima illustrate how hydrosocial territories are not as stable as their materialities seem to suggest, but continuously reconfigured through changing objectives and actor alliances, as well as through contestations and particular power- and interest-driven interpretations of history.

Dam removal, Spain

Spain occupies most of the Iberian Peninsula in the Southwest of Europe. Geographically, it is dominated by a large plateau (the Meseta Central) that is divided by the Central Sierra mountain range and bordered by the Cantabrian Mountains in the North, the Iberian Mountains in the Northeast and the Sierra Morena in the South. The climates present in Spain range from oceanic climate in the Northeast (humid and generally mild temperatures), over continental climate in the Centre (extreme temperatures both in winter and summer, little precipitation), to Mediterranean and arid climate in the south and northeastern coast characterized by hot temperatures in summer and little precipitation, especially in the lower lying and coastal areas. Often times, in water management circles, the North is simplified presented as 'the wet Spain' and the South as the 'dry Spain' (Lopez-Gunn, 2009).

Politically, modern Spain has been shaped by the bitter civil war between left-wing Republicans and right-wing Nationalists throughout 1936 to 1939, which was followed by decades long dictatorship by Francisco Franco until 1975. More recently, since 2018, Spain is governed by prime minister Pedro Sanchez from the Spanish Socialists Workers' Party (PSOE, *Partido Socialista Obrero Español*) in a minority government with the left-wing Podemos party. Besides the central government, also the Autonomous Communities (*Comunidades Autónomas*, each involving several provinces) have considerable political power.

When it comes to water and specifically hydraulic infrastructure, Spain is a highly interesting country. After having lost most of its overseas colonial territories in the 19th century, Spain turned its colonial ambitions inwards, aiming to rework the Spanish geography and distribution of water resources in order to solve complex agricultural and social problems (Lopez-Gunn, 2009). This was shaped by the *regeneracionismo* movement initiated by intellectuals, politicians, engineers and smallholder farmer leaders amongst others, which dreamed of integrating and 'colonizing' all of Spanish

territory through state-led hydraulic interventions that would correct the imbalance between the 'wet and dry Spains' and make sure no water would be 'lost' to the sea (Swyngedouw & Boelens, 2018). Under Franco, the *regeneracionista* dream was captured and coercively continued, lending legitimization to his regime and uniting powerful sectors. In total, more than 600 dams were constructed during his regime, inaugurated by Franco himself who tellingly became known as 'Frankie the Frog' (*Paco El Rana*) (Swyngedouw, 2007, 2015). But also after Franco's death in 1975, the hydraulic paradigm remained highly influential, engrained in strong networks of hydraulic engineers (Duarte-Abadía, 2022; Lopez-Gunn, 2009; Swyngedouw & Boelens, 2018).[3] As a result, today there are over 1,200 big dams in Spain and 26,000 transversal river barriers in total (from big dams to small weirs), making Spain one of the countries with most dams per capita in the world (Funes Casalvázquez et al., 2018; Magdaleno, 2018).

However, things have been slowly changing. With the adoption of the European Union Water Framework Directive in 2000, the decision-making was opened up to more public participation, there was increasing emphasis to coordinate water policy and land use planning, and water basin management agencies have become more diverse in terms of disciplinarity (Lopez-Gunn, 2009; Martínez-Fernández et al., 2020). Furthermore, since the early 2000s a movement for a new water culture has gained increasing traction, being institutionalized in the New Water Culture Foundation (FNCA, *Fundación Nueva Cultura del Agua*) and united by the objective to challenge the lingering hydraulic paradigm (Bukowski, 2017; Hernández-Mora et al., 2015). They have become a critical and influential voice in water management discussions in Spain.

It is also in this context of shifting institutions, power relations and water management approaches that river restoration has received increasing attention. In 2010, for example, the Ministry of the Environment published the National Strategy for the Restauration of Rivers and accompanying guidelines and other resources. Even though the Strategy was never completely implemented (mainly because of a change in government and thus shifting priorities and approaches), by 2020 there were over 300 barriers removed of which a big part was smaller than 2 meters (for example small

[3] There is much more to say about this fascinating period of water management and hydraulic infrastructure construction in Spain. However, it is beyond the scope of this introduction to enter into more detail & there are many excellent studies written about this subject already, see for example Boelens & Post-Uiterweer, 2013; del Moral, 1999; Duarte Abadía et al., 2019; Swyngedouw, 1999, 2007, 2015; Swyngedouw & Boelens, 2018.

weirs) (Ministry of the Environment MITECO, 2020). However, river restoration and dam or barrier removal have sparked many contestations and discussions throughout Spain: within the responsible water basin authorities and also locally with local populations and water users.

In chapter 6 I unpack these contestations surrounding dam and barrier. I first inquire about the shifts in the social, political, institutional and material networks surrounding dams and other river barriers that make dam removal a feasible action proposal. I then scrutinize some of the key debates on national level that centre around imaginaries about past, present and future dams and rivers, reflecting current social, cultural and political positionings. To further elaborate on this, I focus on the discussions surrounding the removal of the Toranes Dam in the province of Tereul in eastern Spain, where removal discussions have been ongoing at the time of research. I pay particular attention to how dam imaginaries and practices are mobilized either in favour of, or to contest, the proposed removal. The analysis provided in Chapter 6 shows first, how dam removal originates from ageing materials and imaginaries, and upcoming new ideologies that relate to earlier historical discussions about nature and society; second; how what a dam (and other hydraulic infrastructures) was, is and can be changes with time and is imagined differently by different actors; third, how studying different momentums in an infrastructure's life – including removal – sheds light on co-existing infrastructural stability and dynamism; fourth, that similar to dam construction, also the promotion of dam removal relies on an ideological and material separation of nature and society, which sparks protests.

1.6 Scientific output and communication

This dissertation is publication based, meaning that Chapters 2 to 6 have been published (three articles) or are under review (two articles) in scientific peer-reviewed journals. Their current publication status and journals are indicated at the beginning of each chapter. Most of the chapters were co-authored by my promoter and – in the case of Chapter 2 and 3 – by others as well. Chapter 6 is a single authored paper, currently under review at *Water Alternatives*. For the sake of readability, I slightly adjusted the papers to become part of this book, eliminating redundancies and providing brief updates on the most recent developments in the case study sites. I also chose to use 'I' as the personal pronoun in the chapters but acknowledge the indispensable contributions of the co-authors at the beginning.

Besides these five principal publications in peer-reviewed journals that form the 'flesh' of this dissertation, I published nine additional articles and book chapters in diverse journals and edited volumes. A complete overview can be found in Annex 2. The additional publications complement the here-presented chapters and represent the empirical and conceptual richness of the three case studies, which was often impossible to fit into one standardized manuscript format as demanded by journals.

The research on the Turkish Ilısu Dam led to one article published in *Geoforum* (see Chapter 3) and a chapter in the book *Los caminos del agua* ('The paths of water') edited by Aline Arroyo Castillo and Edgar Isch Lopez, published by Abya-Yala, Quito and the Water Justice Alliance *Justicia Hídrica* (Hommes, 2017a). In the book chapter, I first critically analyse the Turkish government's interest to materialize the Ilısu Dam, and then show how the dam design and its potential implications comprise Kurdish, European, global, environmental and archaeological dimensions. These dimensions are not mutually exclusive but partially overlapping and show how infrastructures such as the Ilısu Dam are embedded in complex socio-territorial relations and issues on different scales (from the local and national, to the regional and global). It is precisely this embeddedness and multi-dimensionality that called diverse actor groups on the stage of anti-dam mobilizations in southeastern Turkey.

The research on Lima's water infrastructure system brought forward multiple single- and multi-authored publications. First, together with my promoter Rutgerd Boelens I published one paper in the *Journal of Historical Geography* (see Chapter 3) and another one in *Political Geography* (see Chapter 4). I furthermore published single-authored contributions in Spanish in *Estudios Atacameños* (Hommes, 2019) and in the book *A Contracorriente* (Against the flow) edited by Gisselle Vila Benites and Cristóbal Boneli, published by Abya-Yala and the Water Justice Alliance *Justicia Hídrica* (Hommes, 2017b). Furthermore, I soon realized that the study of Lima's water infrastructure system was importantly embedded in wider discussions and dynamics of changing rural-urban relations. Therefore, I co-initiated and then led the editing of a special issue in *Water International* on rural-urban water struggles. In the introduction and conclusion to this special issue (where I was the first author, with co-authors Rutgerd Boelens, Leila M. Harris and Gert Jan Veldwisch), we argue that "urbanization is not a territorially discrete and self-contained phenomenon but involves the constant making and remaking of multi-scalar networks and interactions" (Hommes et al., 2019b: 83). Accordingly, we call for critical analysis of the hydrosocial interrelations of cities and their peri-urban and rural surroundings and also provide some ideas on how to do so (Hommes et al., 2019a,

2019b). These publications clearly show how the water infrastructure in Lima as analysed in this dissertation is part of broader rural-urban connections and how the reach of cities extends far beyond their 'official' boundaries, profoundly reshaping power relations and dynamics in adjacent territories through hydraulic infrastructure and related policies.

In a similar vein, I also participated as second author in the paper "The development and intersection of highland-coastal scale frames: a case study of water governance in central Peru" published in the *Journal of Environmental Policy & Planning* where we analyse how specific problem, solution and scale framings have shaped highland-coastal water policies and interactions in Central Peru between 2004 and 2015 (Grainger et al., 2019). This paper situates the infrastructure complex I focus on in this dissertation in the broader policy context, analysing the evolving discussions among engineers, practitioners, academics and communities about the 'right' rural-urban relations in the Lima region with the conceptual framework of framing (cf. Brummans et al., 2008; Dewulf et al., 2011; Entman, 1993).

Last but not least, I lead the elaboration of other, more general publications. First, together with Rutgerd Boelens, Bibiana Duarte-Abadía, Juan Pablo Hidalgo-Bastidas and Jaime Hoogesteger, we published the chapter "Reconfiguration of Hydrosocial Territories and Struggles for Water Justice" in the Cambridge University Press book *Water Justice*. In this chapter, we analyse through different examples from Latin America and Turkey how the making of territory involves a range of physical, socio-political and discursive strategies and powers, and how that in turn has far-reaching implications for water justice (Hommes et al., 2018). Second, I also led a publication about water governmentalities in *Environment and Planning E: Nature and Space* where I – together with Rutgerd Boelens, Sonja Bleeker, Didi Stoltenborg, Bibiana Duarte-Abadía and Jeroen Vos – analyse "how particular urban-based imaginaries about rural areas, their inhabitants, norms, practices and identities become embedded in governmentality schemes, and how these are justified, materialized and sustained, producing particular entwined rural–urban subjectivities" (Hommes et al., 2020a: 2). In this publication, there was thus a particular attention to the different powers or Foucauldian 'arts of government' at play in rural-urban water supply projects. This focus on governmentalities and the creation of rural and urban subjectivities deepens and complements the conceptual approach and empirical analyses provided in this dissertation. Because of its relevance for the Latin American context (and hopefully also beyond) this paper was translated to Spanish and published in *A&P Continuidad* (Hommes et al., 2020b).

All articles and chapters have been presented at different international conferences, such as for example the International Conference Political Ecologies of Conflict, Capitalism and Contestation (2016, Wageningen), the Political Ecology Network Conference Contested Natures (2020, online) and during diverse Water Justice Alliance meetings (2014 and 2017 in Cusco, 2015 in Cali, 2016 in Wageningen). This served first, to communicate and disseminate research results and second, to benefit from questions, comments, feedback and discussions with other scholars and water justice activists. Sometimes, these interactions helped me to better articulate my own findings and positions; at other times they gave important impulses to think into new directions. I am thus very grateful for the way in which this dissertation has been shaped by many exchanges with engaged, talented and creative other minds.

1.7 Outline of the dissertation

In the present chapter, the general aim and questions guiding this research as well as the methodology and regional contexts of the three case studies in Turkey, Peru and Spain have been introduced. Chapter 2 presents the conceptual framework that forms the base of this dissertation. I first introduce the notion of hydrosocial territories and then draw on Foucault's thinking about governmentalities to show how territorialisation can be understood as a process of ordering social and material relations through the application of different techniques of government; amongst which the design and construction of hydraulic infrastructure. I then engage the notion of imaginaries as seeds that spark territorialisation efforts and that subsequently become materialized in hydraulic infrastructures and new materialities. I also explore ways to conceptualize the intended and unintended effects of hydraulic infrastructure projects through, amongst others, the notion of subjectivities.

After having set the conceptual base, I focus on the three case studies and the ways in which hydraulic infrastructure and connected territorial reconfigurations are envisioned, materialized and/or contested in Turkey, Peru and Spain. The structure in which I present the case studies and their complementary insights follows a thematic logic: focusing first on the pre-construction imaginaries in Turkey, followed by an analysis of how imaginaries become consolidated and materialized through infrastructure in Peru, ending with the discussions triggered by infrastructure's aging and upcoming alternative imaginaries. The concepts introduced in Chapter 2 come back to different degrees and in different ways in each chapter, forming the red thread of this dissertation.

In Chapter 3, I analyse the case of the Ilısu Dam showing how different actor coalitions have imagined different hydrosocial territories regarding this mega-hydraulic project prior to its construction, which was only concluded in 2018. The focus of this chapter lies on imaginaries, their relation to governmentalities endorsed by the Turkish state and the ways in which multi-issue actor alliances construct and mobilize counter imaginaries as a reaction to these governmentality endeavours.

Chapter 4 and 5 then focus on the historic and current developments of the complex system of dams, trans-Andean water transfers, canals and hydropower plants in Lima, Peru. First, I take a closer look at the origins of this system and show how the hydropower plant construction was fuelled and sustained by visions of modernity and dreams of conquering nature through engineers' technical skills, enrolling the local Rímac River and adjacent communities in modern modes of production and living. I also scrutinize the ecological, legal, social and symbolic reconfigurations brought about by infrastructure construction and the way they continue to play an important yet changing role in the watershed's management. In the next chapter, Chapter 5, I then focus on the water transfers that are closely related to the development of hydropower but that have come to play an increasingly important role in the provision of drinking water for Lima. Complementary to the foregone chapter, Chapter 5 focuses specifically on the key role of imaginaries about development, backwardness and an unjust distribution of water resources that needs to be equilibrated through engineered water transfers. Besides these imaginaries, I also show the different forms of power and legal, institutional and financial governance techniques that support the hydraulic grids. In the final part of the chapter, I analyse the material, social-symbolic and political implications of these territorialisation processes for rural and urban water users.

In the last case study, presented in Chapter 6, I focus on the discussions surrounding aging dams and weirs in Spain. I analyse dam removal discussions at national as well as local level, focusing specifically on how dam removal emerges from temporally situated and shifting relations in the socio-political, technical, financial and environmental networks in which dams are embedded. Through a case analysis of the discussions surrounding the proposed removal of the Toranes Dam, I examine stakeholders' diverging imaginaries about the dam, nature, society and cultural heritage in the past, present and future, and how these relate to interests, positions and subjectivities.

Finally, in Chapter 7, I discuss the conceptual as well as empirical insights and issues that arise from the joint analysis of the three cases. I first focus on the conceptual insights and then discuss infrastructure construction in relation to infrastructure removal. I then sketch some points for new engagement for the future and reflect on how I as a researcher and subject have evolved together with this research and vice versa. Lastly, I give a concise answer to the central research question.

Landscapes are both real and imagined. Germans [and others] transformed their river valleys, lakes, moors, and fenlands in the modern era. They drained, diverted and dammed, changing the hydrological cycle, the balance of species and the relationship of people to their environment. Yet, contemporaries also invested in this process of transformation with a variety of metaphorical meanings. They called it the conquest of nature, celebrated it as progress or mourned it as loss, praised the new landscape as ordered or deplored it as geometrical. German wetlands were a screen on to which a changing society projected its hopes and fears.

David Blackbourn in the book *The Conquest of Nature* (2006: 9)

(Re)making hydrosocial territories: Materializing and contesting imaginaries and subjectivities through hydraulic infrastructure

2.1 Introduction: Political geography, infrastructure and hydrosocial territories[4]

Territories, territorialization processes and infrastructures have long been topics of discussion in diverse academic fields as well as societal and political debates. Originally, the notion of territory was associated with studies about state formation that understood territory first and foremost as a bounded space under the control of a nation state. Even though the notion of control over defined geographical spaces has remained a central concern, different scholars have advanced the concept towards a notion that helps to understand the myriad ways in which actors, artefacts or other material structures and the environment interact, shape and coproduce each other within specific spaces (Elden, 2013; Lefebvre, 1991; Marston & Himley, 2021; Paasi et al., 2022; Painter, 2010; Sassen, 2013). It is thus importantly not anymore only about state boundaries and practices, but about diverse techniques; diverse state and nonstate, human and nonhuman actors, and material as well as symbolic aspects and practices.

Also infrastructures have been discussed from different perspectives in political geography scholarship, sometimes with explicit connection to territories and territorialization. These engagements have come forth and benefited from a broader 'material turn' in the social sciences that draws attention to the relational and political characteristics of infrastructure (Anand et al., 2018; Gurung, 2021) as well as more generally studies on the agentive capacities of materials (Strang, 2016; Tilley, 2007) and considerations for materialities in human and political geography (Anderson & Wylie, 2009). Bouzarovski et al. (2015: 217) for example show how both emerging organizational arrangements and material infrastructures for natural gas transit in Europe have created new forms of territoriality, leading them to conclude that territory is in fact a heterogenous "socio-technical assemblage". Likewise, Veelen et al. (2021) mobilize infrastructure as a geographical lens to understand the practices and institutions of democracy (or lack thereof) in different places and times. These and many other contributions importantly build on earlier social construction of technology (SCOT) and science and technology studies (STS) (see for example Callon, 1989; Pinch & Bijker, 1984; Star, 1999; Winner, 1980). They call attention to the politics embedded in and enacted through infrastructure and the various ways in which territorial relations are reconfigured through infrastructure. Beyond changes in the biophysical environment, some studies have also

[4] This chapter is currently under review at *Political Geography* as L. Hommes, J. Hoogesteger and R. Boelens, (Re)making hydrosocial territories: Materializing and contesting imaginaries and subjectivities through hydraulic infrastructure.

focused on how state-society relations change as an effect of infrastructure construction (see for example Akhter, 2015; Meehan, 2014; Suhardiman et al., 2021) while others demonstrated how societal norms are reshaped, thus acting on people's everyday lives and (self)consciousness in often invisible yet incredible powerful ways (Shlomo, 2017). These studies have laid an important base for understanding infrastructure's role in territories. At the same time, in many cases the conceptualization of the agential role of infrastructure remains blurry: how exactly social, political, environmental and material relations change as a result of infrastructure construction and existence is left inexplicit.

Similar discussions have developed in the realm of water governance. Thinking through socio-environmental and political dynamics and territorial transformations has led to the development of notions such as waterscape (Baviskar, 2007; Budds & Hinojosa, 2012; Karpouzoglou & Vij, 2017; Swyngedouw, 1999) and more recently hydrosocial territories that I have introduced in Chapter 1. The empirical studies that have used and further developed this approach, combined thinking on territories with other concepts such as governmentality (Hommes et al., 2020a; Martel et al., 2021), subjectivities (Mills-Novoa et al., 2020), and imaginaries (Rocha Lopez et al., 2019). In general terms, most studies consider power relations as one of the key forces that shapes territories and associated processes and properties, while, at the same time, control of (or a privileged position in) territorial patterning is shown to serve as a source of power (Clare et al., 2018; Delaney, 2009; Sandoval et al., 2017). Another recurring theme is the possibility of a multiplicity of territories within the same geographical space. Hoogesteger et al. (2016: 93) employ the terms 'territorial pluralism' and 'territories-in-territory' to describe how "diverse territories are overlapping, interacting and conflicting in one and the same geographical-political space". This is similar to Agnew and Oslender's (2013) examination of overlapping non-state territorialities that have emerged within simultaneously existing nation states. Such notion of multiplicity is particularly helpful when considering that (hydrosocial) territories and their re-creation do not only refer to already existing materializations but also to the territorial imaginaries that project visions about desired social, cultural, political, ecological, technological and related material orderings. Considering the multiplicity of actors (and their respective ontologies, epistemologies and interests), imaginaries about what territory is and/or should be are likewise diverse and often profoundly contested.

In many hydrosocial territories studies, hydraulic infrastructure is central. This is a continuation of the long tradition in water studies to focus on hydraulic infrastructure: originally mainly concerned with engineering aspects of designing, constructing and operating infrastructure such as dams or irrigation systems, nowadays in the field of political

ecology of water also concerned with the politics, power and morals embedded in hydraulic infrastructure (Shah & Boelens, 2021). One of the common underlying thoughts of these studies is that the material and the nonhuman (such as water infrastructure) are inherently political and play a decisive role in the socio-material negotiations about territory. However, despite of infrastructure's material visibility and obvious presence, the exact role, effects and 'acting' of hydraulic infrastructure often continues to remain rather ambiguous. This is similar to the unclarity in conceptualizations in political geography scholarship on the role of infrastructure in social, political and material territorialization processes.

In this context, this dissertation and specifically this chapter aims to further conceptualize hydraulic infrastructure's role in making and remaking territory, and thereby contribute to ongoing debates in political geography, political ecology and water governance by directing attention to the role of infrastructure and nonhuman materialities more broadly. This is done through drawing together the notions of territories, governmentality, imaginaries, hydraulic infrastructure and subjectivities in a comprehensive framework.

In the following, I first draw on parts of Foucault's notion of governmentality to show how territorialisation can be understood as a process of ordering social and material relations through the application of different techniques of government, amongst which the design and construction of hydraulic infrastructure. I then review scholarship on imaginaries and argue that imaginaries spark territorialisation efforts, being materialized in hydraulic infrastructures and new materialities. Next, I explore the repercussions that these infrastructures, and the imaginaries they embody, have for how people understand and relate to each other, nature, water, technology and space. Specifically, I bring in the notion of subjectivities to engage with the ways in which infrastructure influences how people relate to each other, technology and nature. Finally I show that even though infrastructure may represent the ultimate attempt to fix imaginaries and socionatural relations, such relations always remain a contested and dynamic playing field.

In order to illustrate the conceptual considerations presented in this chapter, I will use the river Rhine and the 19th century rectification works as an example. Even though not an infrastructure in the conventional sense, the Rhine is an excellent example of the visibility yet invisibility of hydraulic infrastructures and the long history of sociotechnical mediation embodied in, and reflected through, many water flows that we see around

us each day. The Rhine is not a case study of this research, but it is the river that has been constantly flowing through my life: from early childhood memories during ferry crossings or on the shores of the Cologne Bay (in the middle river stretch), to after-lecture beers on the 'Wageningen beach' of the Dutch Lower Rhine during my student times, and a bicycle trip I did in 2020 during the Covid pandemic following the Rhine from my old home Leverkusen (Germany) to my current home Utrecht (The Netherlands) through diverse grey-industrial and open-green landscapes. Illustrations from the Rhine rectification are presented in separate text boxes. I will not provide a full historic account, which has been done by others (for example Balmes, 2021; Blackbourn, 2006; Cioc, 2002; Decloedt & Delvaux, 2001), but use anecdotal examples mainly from David Blackbourn's analysis in *The Conquest of Nature* and Marc Cioc's book *The Rhine – An Eco-Biography*.

2.2 The (re)making of territory through diverse techniques of government

To fully grasp the territorialization dynamics associated with infrastructure, Foucault's insights on governmentality are helpful as they allow to open the gaze to the many parallel, contradictory workings of power – specifically 'arts of government' or governmentalities – in and through infrastructure. This proposal to consider Foucault's work is partially inspired by its (albeit limited) mentioning in hydrosocial territory literature (for example Birkenholtz, 2009; Hommes et al., 2020a; Martel et al., 2021; Mills-Novoa et al., 2020; Valladares and Boelens, 2019), but also draws on insights generated in environmental studies more broadly (for example Agrawal, 2005; Bridge & Perreault, 2009; Fletcher & Cortes-Vazquez, 2020; Li, 2007; Singh, 2013). The governmentalities that are commonly evoked in the latter are the sovereign, disciplinary and neoliberal governmentalities. Rather than going into detail about each of these types, I want to focus on the broader insights that Foucault's power analysis offers to understand territorialisation processes (Foucault, 1980, 1991, 2008).

In one of his first discussions of the notion of governmentality, Foucault (himself inspired by Guillaume de la Perrière) has introduced the term 'disposition of things': "Government is the right disposition of things, [...] a sort of complex composed of men and things. The things with which in this sense government is to be concerned are in fact men, but men in their relations, their links, their imbrication with those other things which are wealth, resources, means of substance, the territory with its specific qualities, climate, irrigation,

fertility, etc.; men in their relation to that other kind of things, customs, habits, ways of acting and thinking, etc." (Foucault, 1991: 93). What Foucault terms the 'disposition of things' links to conceptualizations of hydrosocial territory, especially so if we consider territorialisation as the effort (conscious and unconscious) to bring about the right order of 'things' in a certain space. 'Things' in this context refers broadly to the socio-material, which includes nature, infrastructure, knowledge, people, subjectivities and the relations that emerge among these.

According to Foucault, the 'right disposition of things' is achieved through different kinds of ordering efforts or, in his terminology, techniques of government, as I have started to outline in Chapter 1. He points to the multitude of techniques and forms of power that are used to 'conduct the conduct' of people through sovereign, disciplinary and neoliberal governmentality (Dean, 1999; Foucault, 1975, 1991). What is important is that Foucault understands power as productive rather than destructive, which allows to set power at the core of the production, re-production and transformation of territories, imaginaries, subjects and subjectivities. Moreover, he considers power as relational and performative: it is not held but exercised through human and nonhuman relations and actions (Foucault, 1982). In the same sense, territories are relational and performative. Rather than a rigid assemblage of 'things' in space and time, territory is the time-bound enactment of socionatural relations in a given geographical space.

Furthermore, the notion of government being directed at 'conducting the conduct' of populations helps to see hydraulic infrastructure as an important force that structures fields of action not only in the mere material sense, but also through the creation of objects (that are acted upon) and subjects (that act upon themselves). The latter contribute to the production, reproduction and transformation of territories through their relations and understandings of each other, nature, water, infrastructure and space (Mills-Novoa et al., 2020). Before going into further detail about these implications of infrastructure, I first engage with the notion of imaginaries as seeds of efforts aimed at making territories, or in Foucault's terminology 'the right order of things'.

2.3 Imaginaries as seeds of territorialization

Imaginaries play a central role in the construction of infrastructure and the making of territories (see for example Brighenti, 2010; Fry and Murphy, 2021; Raffestin, 2012), and actually have a long tradition in diverse scholarly fields. Since Edward Said's *Orientalism*

(1978) and Benedict Anderson's *Imagined Communities* (1983), amongst others, various studies have taken up the notion of imaginaries (Derek, 1994; Harris, 2014; Harvey, 1990). Björkdahl (2018), for example, shows how the Republika Srpska comes into being as a state within the national boundaries of what is officially known as Bosnia-Herzegovina in the midst of war through imaginaries and associated performative practices. Fry and Murphy (2021) analyse geo-imaginaries about (un)certainties and possibilities for hydrocarbon production in the Burgos Basin in Mexico. They argue that geo-imaginaries are "not just narratives and visual devices, but also forms of governmentality that aim to shape the practices, behaviours, and calculations of people in their relations" (Fry & Murphy, 2021: 2). What stands out from applications of imaginaries in the field of geography (for an overview and review see Watkins, 2015) is that it is mainly imaginaries about places and their characteristics (for example resources) that are considered relevant. Yet, imaginaries that have effects for the constitution of territory are not only imaginaries about places but also about populations, relations, and – importantly – in a broader sense about what the 'order of things' is and should be.

This is something that has been more explicitly analysed in science and technology studies, and then later been taken up in water politics and water governance scholarship. Many of these studies make use of Sheila Jasanoff's notion of sociotechnical imaginaries as "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015a: 4; cf. Jasanoff & Kim, 2009). Barandiarán (2019), for example, analyses how lithium extraction in Latin American countries is imagined to foster a technologized and thus more sustainable development; whereas Perreault and Valdivia (2010) show how social movements in Bolivia and Ecuador advance alternative imaginaries of 'proper' hydrocarbon governance, drawing on ideas of nationhood to seek to restore state sovereignty over hydrocarbon. In the realm of water governance, Mills-Novoa et al. (2020) analyse how climate change adaptation projects mobilize specific imaginaries of territories and subjects for intervention, through knowledge claims, techno-scientific tools (for example climate modelling and vulnerability mapping) and selective recognition of local customs that fit with the overall project narratives and objectives. In a slightly different manner, Rocha Lopez et al. (2019) study an interbasin water transfer and irrigation project in Bolivia as an arena of contestation between stakeholders groups and their respective diverging hydrosocial imaginaries. These studies have demonstrated how imaginaries are part and parcel of socio-territorial dynamics, being enacted and re-enacted through relations, institutions, knowledge claims, discourses and hydraulic infrastructure (cf. Martel et al., 2021).

What is of particular importance is the fact that imaginaries are inherently prescriptive and contain, amongst others, normative statements about morality (Miller, 2019; Taylor, 2004; Shah and Boelens, 2020). This makes them powerful vectors to shape lifeworlds and identities. When realized, institutionalized and normalized, imaginaries may become invisible and remain present as underlying, often unquestioned frames in which people understand themselves and "imagine their social existence" (Steger and James, 2013: 23; cf. Taylor, 2004). In that way, imaginaries provide the background within which subjectivities are formed, understood and enacted. They can thus be subconsciously present, as cognitive frames that shape everyday understandings and desires. At the same time, imaginaries can also be strategically created and mobilized to institute or contest territorial projects (Fry & Murphy, 2021; Jaramillo, 2020; Meehan, 2013; Swyngedouw, 2015). Accordingly, struggles over territories need to be understood as struggles over imaginaries and associated identities, subjectivities and meanings that concern the wished-for hydrosocial territorial order and the ways of life that are regarded as 'good' and desirable (and those that are not) (Dukpa et al., 2019; Molle et al., 2009; Ženko & Menga, 2019).

In the case of the discussions surrounding the controversial Ilısu Dam project in southeastern Turkey (see Chapter 3), a number of actor alliances were formed that promoted specific imaginaries about the dam according to their respective background, interests and identity. For example, environmental NGOs viewed the dam as extremely destructive for local biodiversity and cultural heritage. This enabled them to challenge the imaginary of the Turkish state, which envisioned the dam as a measure for securing energy and thereby related it to the energy security of the nation and development of the region. Even though, after years of discussions, the Ilısu Dam finally became constructed, dam opponents inspired protest actions, challenged dominant imaginaries and managed to unite groups of people under a common banner (Eberlein et al., 2010; Warner, 2012).

This indicates that whether or not imaginaries are realized is contingent upon a group's ability to mobilize the necessary political, cultural, intellectual, financial and/or physical-coercive power (Dupuits et al., 2020; Hoogesteger et al., 2016). Imaginaries may be fostered, advanced and imposed by a powerful minority even in the wake of protests of marginalized or divergent groups. Their materialization depends on existing power relations and other contextual factors. It is thus also pivotal to consider imaginaries in their linkages and embeddedness with the very particular economic and political actors and institutions that are propagating them. Likewise, imaginaries

have path dependency. They are conditioned and shaped by their historic as well as present day socio-political and territorial context rather than emerging 'out of nowhere'. We can think about it in terms of an iterative process: imaginaries form in a particular context, reconfigure this context for example through their materialization in hydraulic infrastructure, and are in turn again changed as a result of the emerging situation. Oliver (2000) illustrates this in his analysis of the Thames embankment in England where the modern desire to control nature was realized in technological and hydrological designs and construction projects. Subsequently, the resulting changed landscapes shaped understandings of what is modern nature and the corresponding modern citizenship. In a similar manner, modern aspirations are generally characterized by a fascination for expert and engineering skills, and their promotion facilitates ever more complex and grand construction of infrastructure. This then again ignites and strengthens the belief in technology and its importance for bringing about 'progress' (Swyngedouw, 1999, 2007).

Imaginaries about modernity are central in many grand infrastructure projects such as large dams, irrigation schemes or hydropower plants. This can partly be traced back to the resource-intensive character of large-scale undertakings and their connectedness with resourceful nation states, powerful lobby groups, construction companies and broader nation-building projects that consolidate national territory and control (Harvey and Knox, 2015; Meehan, 2014; Mollinga and Veldwisch, 2016; Mosse, 2008; Obertreis et al., 2016). Modernity in this context is often associated with key characteristics such as the belief in continued progress, the belief in planned social, ecological and technological futures, the centrality of science and technology, and the need to control and domesticate nature (Kaika, 2006; Nixon, 2010; Zwarteveen, 2015). Especially the last two aspects are intrinsically connected to hydraulic infrastructure as they have made it possible to enrol nature as an economic resource in intensifying and expanding modern production systems. At the base of these undertakings is a modern imaginary of nature as external to society, as disordered, savage and something to be controlled and put to productive use through advancing science and technology (Bauman, 1991; Oliver, 2000). Nature is thus imagined as an entity that awaits to be mastered and turned productive for societal benefit (Brewitt, 2019; Swyngedouw, 2015). At the same time, modern imaginaries that envisage territorial transformations do not only aim to transform the spatiality and materiality of territories but also its social and political relations.

BOX 1 – RIVER RHINE AND TULLA THE TAMER

Seeing the Rhine through the lens of the here presented conceptual framework allows understanding it as a product of historic and ongoing engineering, technical and ecological adjustments, imaginaries and socio-political relations. Originally, the Rhine (especially the upper part) was characterized by a constantly transforming labyrinth of water ways, side arms, loops and islands. So much, that "in Roman times, the town of Breisach lay on the left bank of the Upper Rhine, but by the tenth century the river's banks had shifted to such an extent that Breisach was situated on an island. By the thirteenth century it lay on the left bank again, and after the fourteenth century it was once again on the right bank" (Cioc, 2000: 48).

Villages along the shores had been living with the recurring risk of flooding and tried to counter this through constructing smaller dikes, ditches and cuts; inscribing their interests in river flows and landscapes. These early hydraulic works represented a constant negotiation over land between humans and the space-claiming Rhine. Notably, outcomes of these river modifications also reflected *societal* power relations: "these games of hydrological leapfrog were power struggles between the Palatine left-bank and the Badenese right-bank" (Blackbourn, 2006: 84).

When the young engineer Johann Gottfried Tulla entered the stage of civil engineering and regional politics in the late 18th century, what was imaginable with regards to the management of the Rhine and especially flood risks changed. Tulla envisaged a large-scale concerted effort to cut and rectify different parts of the Upper Rhine in dimensions never seen before. Many declared him insane and his plan impossible. Nevertheless, Tulla succeeded to plant the seed that made large-scale rectification possible. Importantly, he mobilized a powerful imaginary of a savage Rhine that needed to be disciplined through engineering works (his gravestone at the Montmartre cemetery in Paris reads "Johann Gottfried Tulla: Tamer of the Wild Rhine").

His vision of the Rhine (represented by the brown middle line in Figure 3) was one of a straight and stable river, controllable and tameable; not a meandering, wild or mystic river as represented in many poems, paintings

and myth (Decloedt & Delvaux, 2001; see Figure 4). Order was to be established; his hydraulic works were to materialize his views and norms in the landscape. Yet, the envisaged order was not only about the waters of the river, but also about ordering its people and correcting their supposed ignorance: "*Everything* along this stream will improve once we undertake the rectification work. […] The attitude and productivity of the riverbank inhabitants will improve in proportion to the amount of protection their houses, possessions, and harvests receive. The climate along the Rhine will become more pleasant and the air cleaner" (Tulla cited in Cioc 2002: 38; emphasis added). Rectifying rivers and people at once.

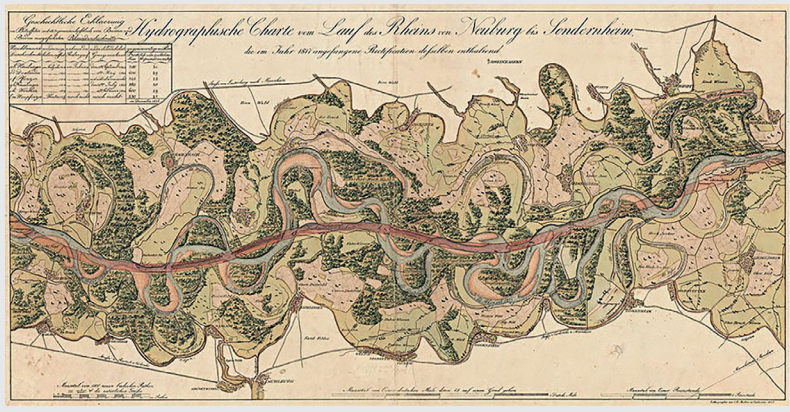


Figure 3 Map of the Rhine rectification in Neuburg
(Zimmermann, 2015: 27)

Figure 4 "Father Rhine" by Moritz von Schwind, 1848
(Raczynski Foundation at the National Museum, Poznan)

2.4 Fixing territorial imaginaries through hydraulic infrastructure

Philosophy of technology traditions and, more recently, science and technology studies (STS) have conceptualized infrastructural systems from different perspectives. Studies on technological paradigms and regimes showed how the existing technological systems constrained or enabled the emergence of new ones, creating path dependent infrastructural development (Dosi, 1982). Building on earlier critical traditions (such as the Frankfurter Schule and others), STS has analysed how technological systems are infused with politics, morals, motives and ethics, and how technological infrastructure is deliberately used to create certain forms of social order (Akrich, 1992; Verbeek, 2011; Winner, 1980).

The three central yet intrinsically connected questions inspiring these inquiries are: How does infrastructure come into being? What are the social, political and normative contents that are embedded and inscribed in infrastructure, steering its operational functioning (its 'contents', 'code', or overt and covert 'user guide')? And third, what are the emergent effects, once infrastructure is put in practice? (Latour, 2002; Turner and Johnson, 2017; Winner, 1993). In terms of the becoming of infrastructure, socio-technical imaginaries that envision the shaping of a certain hydrosocial territory through the construction of infrastructure are central (Cantor, 2021; Jaramillo, 2020; Shah & Boelens, 2021). As outlined in the previous section, these imaginaries inscribe material, social, and cultural relations into infrastructure designs.

When it comes to its effects, infrastructure establishes new relations between the 'things' that make up territory, (re)structuring the fields of action through material objects that change water flows and through it also the relations between nature and society and within society itself (as will be further elaborated in the following section). This restructuring is, in first instance, ordered by the technological inscriptions (intended and unintended) that define by whom and how infrastructure and related water flows are controlled and to what end (Godinez-Madrigal et al., 2020; Hidalgo-Bastidas & Boelens, 2019a; Mollinga & Veldwisch, 2016).

This connects to the earlier mentioned conceptualization of infrastructure as open-ended systems (Jensen & Morita, 2017; see also Chapter 1): infrastructure exists in its materiality but also in its imbrication with a multiplicity of other material and nonmaterial elements such as knowledges, bureaucracies, desires, fantasies and subjectivities. This

is evident in the case of rural to urban water transfers – such as in Lima – where hydraulic infrastructure and accompanying institutional and legal arrangements redirect water flows and redefine water access and control in material but also in legal and institutional terms. Who is included and who is excluded as prioritized water user, decision-maker or infrastructure designer is defined. Likewise, desires of an urban modern lifestyle and a (material and symbolic) demonstration of the abilities of engineering are imprinted onto landscapes. En route, the environment but also political arrangements, power relations, the social and self-awareness of those involved and affected, as well as place-based everyday practices change. Thus, (hydraulic) infrastructure (re)arranges things and relations, and is therefore a particularly powerful way to materialize and fix imaginaries and related power relations in space and time. Hence, infrastructure and the control of it are key in processes of territorialization and the control of space.

However, in practice there is always an inherent tension between the intentions of design and the unpredictability arising from complex interactions. For instance sewage systems or water transfers are invested with particular forms of politics and morality, while also other social actors, bacteria, sludge, sediments or ghosts engage with and transform these infrastructural systems intentionally and unintentionally into newer forms. The diversity of human and nonhuman actors acting in and upon infrastructure is particularly complex and thus central in the case of water infrastructure as opposed to other infrastructures (Bouzarovski et al., 2015; Harvey & Knox, 2015; Suhardiman et al., 2021) because of the inherit biophysical and material qualities of water and hydraulic infrastructure that are characterised by the presence of numerous flowing, living and acting humans and nonhumans such as the above mentioned. Therefore, intended designs and unintended responses all happen at the same time.

2.5 Creating subjects and changing subjectivities

As mentioned, hydraulic infrastructure projects have far-reaching intended and unintended effects on 'the order of things'. Importantly, they create subjects and change subjectivities. These are two distinct yet interrelated processes which I elaborate on in the following.

2.5.1 Creating new subjects through socio-technical interventions

The design, construction and operation of infrastructure to fix a specific hydrosocial order in geographical space is never a standalone. Infrastructure is always embedded

in a broader socio-technical system that is created to order geographical spaces and the socio-material relations that re-create a specific hydrosocial territory. To materialize and sustain this territorial fix, subjects (engineers, technicians, operators, decision makers, users, beneficiaries, etc.) are needed that enact, perform and sustain the envisaged hydrosocial territory (Mills-Novoa et al., 2020). Therefore, powerful actors engaged in fixing specific imaginaries through infrastructure actively re-constitute existing subjects through diverse subject-formation strategies throughout the various phases of infrastructural design, construction and operation (Mills-Novoa et al., 2020). As Foucault states, there are multiple overlapping governmentalities at play in the creation of 'desired' subjects (Foucault, 1991). Infrastructure development is commonly entrenched in specific forms of sovereign governmentality (for example legal norms and regulations; threat of punishment), neoliberal governmentality (for example establishing financial-economic incentives to act in accordance with market forces), and disciplinary governmentality aimed at forming self-correcting subjects through the establishment of moral and ideological beliefs about right and wrong (Agrawal, 2005; Birkenholtz, 2009; Burchell et al., 1991; Fletcher & Cortes-Vazquez, 2020; Hommes et al., 2020a).

The actual changing of subjectivities or subjectification through hydraulic infrastructure can happen through different processes. For example, hydraulic infrastructure projects are frequently accompanied by powerful discourses, which include the promotion of subjectivities in which individuals come to conduct themselves under a certain imagined or factual authority, system of truth and normativity (Jasanoff & Kim, 2015; Pfaffenberger, 1988). In particular the central role of systems of truth and regimes of knowledge in the processes of subjectification has resonated in the work of numerous scholars. In relation to water infrastructure, Aubriot et al. (2018), Godinez-Madrigal et al. (2020), Hidalgo-Bastidas and Boelens (2019a), Mollinga and Veldwisch (2016), Mosse (2008) and Shah et al. (2019b), among others, have extensively analysed how knowledge politics are central in the conceptualization, design, development and implementation of large-scale hydraulic infrastructure; as well as for the shaping of subjectivities connected to infrastructure projects (see also Boelens et al., 2019; Furlong, 2011). Whose knowledge and related institutional and normative frameworks are seen as legitimate and whose not, or notions of what can be known and what cannot, are part and parcel of processes of subjectification.

Hoogesteger (2015) shows how the construction of the Pillaro-Ramal Norte irrigation system and the creation of new water users associations in the Ecuadorian Andes

aimed to create 'rational' water users that would maximize production, manage their irrigation systems according to state guidelines and ensure the economic viability of the irrigation system's operation and maintenance. In Chapters 4 and 5 I demonstrate how urban water supply projects create specific subjects before, during and after the actual physical construction: rural subjects that accept water transfers from rural to urban areas out of a felt moral obligation to not impede urban 'progress'; and urban subjects who see themselves as rightful consumers of water transferred from rural territories as imagined with abundant water resources (see also Lord et al., 2020; Meehan, 2013). In that sense, some of the envisioned subjectivities may relate to broader imaginaries beyond the ones related to the infrastructure itself, such as the previously mentioned modern imaginaries.

2.5.2 Changing subjectivities through hydraulic infrastructure

Hydraulic infrastructure changes the physical-material environment and with it the field in which people's subjectivity becomes (Lemke, 2015). Subjectivities in this case refer to the ways in which people understand and relate to themselves, human and nonhuman others. They form the base of people's (self)perceptions, relations, actions and interactions which are central to the making, upholding or changing of territories. This 'power to structure' of infrastructure makes it a highly moral matter as infrastructure's materiality and accompanying effects contribute to giving answers to the moral questions of how to live and how to act (Borgmann, 1995; Shah and Boelens, 2020). In other words, water technology is 'moralized', bearing its designers' class, gender and cultural norms. Infrastructure performs as 'hardened morality' and 'materialized power' (Latour, 2002; Pfaffenberger, 1988), organizing inclusion and exclusion, enabling particular organization and behaviour, and disabling others. For instance, the canals in the upper Mantaro watershed that were constructed to transfer water to the city of Lima, cut through local communities' territories and obliged them to change livestock grazing patterns. At the same time, these canals link the highland communities to downstream water users, changing understandings (subjectivities) of belonging and position within the watersheds (cf. Hoogesteger & Verzijl, 2015). Communities are *included* in the city's water quest and *excluded* from free movement in and around the constructed reservoirs.

Hydraulic infrastructure's materiality also changes subjectivities in more indirect ways. For example, by redirecting water flows and changing landscapes, the ways people relate to and experience their environment change. As Singh (2013: 191) shows, "the boundaries between the 'self' and the environment […] [are] porous, and […] human

subjectivity is shaped by a human being's engagement with its total environment, not just its social environment". This is to say that if the environment changes, so does people's relation to it and also part of their subjectivity, depending on people's connection (or disconnection) with the environment. Verzijl et al. (2019), for example, show how in Cuchoquesera, Peru, the meanings and relations between and among humans, nature and the supra-natural transformed after the construction of a large dam as people gave the new infrastructure, themselves and nature new meanings and established new relations.

Another case where this is visible are discussions surrounding many dam removals: parts of the population have come to regard the regulated and impounded water flows behind dam structures as a natural phenomenon, as part of local history and identity. They render any change in the human-controlled landscape by the act of dam removal as unnatural and "a moral indictment of their way of life and work" (van Wieren, 2008: 247). In contradistinction, for proponents of dam removal, the removal will restore nature and thereby provide a possibility to create embodied acts for "spiritual-moral meaning in relation to nature and its restorative care" (van Wieren, 2008: 244). This example of diverse experiences of landscapes and nature restoration points to the tension between normative and lived subjectivities (cf. Gibson, 2001), as well as to the divergent ways in which water and infrastructure are lived and experienced (Linton & Budds, 2014; Vos et al., 2019).

BOX 2 – MATERIALIZING IMAGINARIES, MAKING SUBJECTS

How did Tulla and his allies manage to realize his vision of the Rhine and turn it into the largest civil engineering project in Germany at that time? The short answer is: political momentum, coercive force and truth politics. The Rhine and its destiny have been deeply entwined with policy, nation building and diplomacy. Especially so in the aftermath of the French Revolution, when the state of Baden, Tulla's employer, saw itself benefited with new territories along the Rhine. However, in order to consolidate this newly acquired territory and political control, they needed to create citizens and subjects out of people who at that point saw the Badenese ruler as a "foreign usurper" (Cioc, 2002: 50; cf. Blackbourn, 2006). They did so through bureaucratic centralization, the production of new maps, information, population surveys, reformed tax system (cf. Anderson, 1983), but also had the idea to integrate the new state through river rectification works. The Rhine was the artery that all riparian territories had in common and – so it was believed – rectification could serve to unite, to integrate, to form a common Rhine identity, to make subjects.

At the same time, during the reign of the Napoleonic Empire, Baden also tried to promote Rhine rectification to France as solution to border questions (see Figure 5). Because the originally fluctuating character of the Rhine waters was difficult to reconcile with the idea of a static national border, Tulla's rectification project provided the infrastructural fix for this problem. Moreover, portraying the Rhine as a 'natural frontier' allowed France to strategically re-frame 'land acquisitions' as conforming with natural borders rather than being forceful military occupations.

Thus, even though the Baden and Napoleonic states as well as Tulla himself had, at that time, different underlying interests and 'imaginaries of departure', the rectification could serve all. As a result of these political developments, the space was opened for Tulla's proposals to be heard. Nevertheless, it was only in 1817 that works actually started. When the time came, however, the availability of labour and resistance from affected villages that opposed the scheme provided the next problems. The first was, in the beginning, addressed through making use of compulsory work (based on the old

feudal system (Cioc, 2002: 53); the latter was solved by providing military protection at rectification construction sites to put down any disturbances by 'unruly subjects'. Furthermore, Tulla was rigorous in dismissing opposition as ignorant and narrow-minded, establishing an expert-only morality and truth-claim about the Rhine and the envisaged project:

"The difficulties and obstacles that stand in the way of rectification of the Rhine do not lie in the task itself, in the river and the areas surround it, or in excessive costs, or in adequate returns, or in the need to make exceptional sacrifices, but make themselves felt for the most part according to […] whether the active agents are more or less enlightened and moral" (Tulla in a letter to an engineer colleague, 1825 cited in Blackbourn 2006: 99).

Figure 5 "Germania as Watch over the Rhine" by Lorenz Clasen, 1880 (Kunstmuseen Krefeld)

2.6 The dynamic nature of hydrosocial territories

Though built infrastructure is an ultimate attempt to fix an imaginary and create a corresponding hydrosocial territory and subjectivities; infrastructure, imaginaries and territorial relations are constantly challenged in different ways by actors as well as broader changing socio-environmental conditions as is further elaborated in this section.

2.6.1 Faults and fractures along the infrastructural fix

Reconfigurations triggered by infrastructure are rarely what is initially imagined and intended. On-the-ground relations and interactions are far too diverse, complicated and dynamic for a one-to-one materialization of imaginaries. Outcomes are more often than not unforeseen and surprising (Harvey and Knox, 2015; Jensen and Morita, 2017; Lesutis, 2021; Long and Ploeg, 1989). For example, Harvey and Knox in their anthropological study of roads that form part of the Peruvian state's efforts to consolidate a national territory, conclude that the roads "become part of the mundane material fabric of people's lives, producing possibilities and limitations that go beyond any specific plan for integration or connectivity" (Harvey and Knox, 2015: 186). As Jensen and Morita (2017) assert, infrastructure is not simply implanted onto a tabula rasa but becomes embedded in a network of existing historical, technical, geographic, socio-political and cultural conditions and relations – with unpredictable, experimental and open outcomes.

This is well documented in many critiques to development that show how most hydraulic structures fail to perform as expected (Jasanoff & Kim, 2015; Scott, 1998). Irrigation systems systematically underperform in terms of expected increases in agricultural productivity as well as in irrigated area. Domestic water supply systems loose water and don't deliver the quantity and quality water that was projected. Hydro-powerplants rarely produce the envisaged electricity outputs. These faults and fractures come from the unpredictability of nature, infrastructure and its intrinsic properties in use, and the social system that manages and uses the infrastructure. Bolding et al. (1995) for instance show how irrigation engineers in the Tungabhadra irrigation system in India engage in a constant design and re-design of irrigation infrastructure with the aim to control the water flows and production in the system. Despite of these constant efforts, the technologies never worked as foreseen. Water flows were insufficient, sediment loads changed the properties of the structures, or technologies were adapted by users. Finally local power relations and the interactions between field staff and specific

groups of users led to the operation of the infrastructure with a different rationale than that of the state engineers that designed the infrastructure.

Thus, how hydraulic infrastructure is eventually embedded in territorial networks and encounters depends on ecological, political, cultural and other factors and changes through time. For example in the Santa Eulalia watershed, through which a big share of Lima's drinking water supply flows, concerns about climate change and an ever growing urban water demand trigger a rethinking and challenging of hydrosocial relations. Whereas in the past relations between hydropower companies and communities were characterized by compromise, communities now fiercely negotiate the distribution of financial benefits derived from the water resources. Also, the legal formalization of communal access to water has been integrated in local political campaigns responding to the fear that water might be 'cut off' from communities if overall water availability decreases while urban demand increases. Thus, even though the concrete materialities in the watershed such as reservoirs, canals and hydropower plants have remained largely unchanged, the connected assemblages of relations and interactions between actors, artefacts and ecology remain in constant transformation.

2.6.2 Unruly subjects and changing subjectivities

Subjectivities are not simply and unidirectionally shaped by hydraulic infrastructure, related imaginaries or subjectification endeavours. Rather, it is a dynamic and contested process in which people negotiate their subject positions and can also assume different overlapping – and at times contradicting – subjectivities (Verzijl et al., 2019). In that sense, processes of subjectification through infrastructure development should also not be understood in terms of domination or causing oppression alone. Subjectification is not always an intentional strategy (Huxley, 2008) and can, furthermore, be experienced as affirming, valuable and desired as "it is, after all, what constitutes the subject" (Gibson, 2001: 649). In a similar vein, created subjectivities can be productive, not only in terms of producing behaviours, relations and experiences, but also certain forms of imaginaries. This is to say that subjectivities can give rise to new imaginaries out of the creative potential, emotions, an opportune change in the broader living environment or a combination of these, which in turn can result in individuals or groups embarking on imagining and shaping alternative socio-material realities. In the words of Gibson (2001: 665), referring to Connolly's work (1999), there is always the possibility for "fugitive energies" that exceed the set of identities institutionally 'given' and 'assumed'" and that may result in imagining and realizing new socio-territorial directions.

This, in fact, responds to some of the often raised criticisms of Foucault, namely that his understanding about subjectification would be 'resistant to resistance' – in other words, disallowing a subject that can transcend the regime of power. Rather (and Foucault's own counter-conduct writings exemplify this), the subject needs to be considered as indeterminable, because of those fugitive energies but also because of its articulation with a multitude of different discourses, and its capacity to question regimes of truth (Cadman, 2010; Pickett, 1996).

One instance where such processes of change and the emergence of counter imaginaries is apparent, are the discussions surrounding dam removal in Spain. The creative potential of individual subjectivities as well as values shared among a network of people has brought forth a new understanding of nature-society relations in which rivers are to be (at least partly) liberated from anthropogenic alterations such as dams (Brummer et al., 2017; Bukowski, 2017; Hernández-Mora et al., 2015). The emerging new water culture movement is broad and diverse, but interestingly includes actions directed at changing people's subjectivities, in particular the way they relate to their natural environment: in different cities, river walks are organized as embodied acts to reconnect people to their local rivers with the hope that this will change their care for water and their ideas of 'good water management' towards more nature-based approaches (Caminar El Agua, 2020). Besides the changeableness of subjectivities, this also alludes to what was elaborated above: that not only the construction of hydraulic infrastructure reconfigures subjectivities but potentially also its removal.

BOX 3 – UNFORESEEN OUTCOMES AND TRANSFORMED RHINE RIVER(S)

When imaginaries became fixed in the landscape through the Tulla Rectification Project (1817-76), this sociotechnically mediated landscape (and the society, knowledge, institutions associated with it) in turn profoundly and lastingly changed the Rhine, its management and existing ideas about 'progress' in general terms. As Cioc (2002: 48) puts it: "Tulla was for the Rhine what Napoleon was for Europe: the remaker of worlds and the redrawer of maps".

Materially, the length of the Upper Rhine was reduced by 82 km, the riverbed width became uniform (between 200 and 250 metres), waterborne diseases disappeared, around 10,000 hectares of land were reclaimed for cultivation and settlements (Cioc, 2000). Many villages could now enjoy improved flood security, confidence to build livelihoods close to the tamed river, better health and increased agricultural productivity. At the same time, former gold miners that had long mined the famous 'Rhine gold' (later eternalized in Wagner's opera and a train route from Geneva to the Hook of Holland) had to look for other sources of income. Also, improved upstream flood security for some created increased downstream flood risks for others (Blackbourn, 2006). Unevenly distributed benefits and burdens – differentiated along class lines and geographical scales –profoundly changed the material and ecological realities at once with people's livelihoods, daily routines and subjectivities.

Moreover, the constructed rectifications generated unforeseen material outcomes as erosion patterns were far more complex and erratic than foreseen by Tulla. For example: "just below Basel, at the Isteiner Klotz (a cliff outcropping), the Rhine dug down 7 meters until it hit sheer rock. The rocks created rapids, making it increasingly difficult for ships to navigate upstream to Basel" (Cioc, 2000: 54). Some of these negative effects later had to be 're-corrected' by additional river infrastructure works: correcting the correction. Fault and fractures along the infrastructural fix.

Despite of this, many more rectifications, dikes and other interventions have followed since the early Tulla works. The idea of what the Rhine is and should be was changed forever, and keeps on transforming. At the moment, the Rhine is one of Europe's busiest waterways, a (albeit still not entirely fixed) national border between France and Germany, a source of cooling water for power plants, a comforting place for relaxing, a site for transboundary water cooperation, a possible future ground for bountiful salmon and eel populations, the destination for excursions and bicycle trips. Whereas Tulla certainly changed how the Rhine flows and thus how it is seen, lived and thought, multiple overlapping and contradictory imaginaries keep on existing.

Figure 6 View over the Rhine and the Bayer factory in my hometown (Stadt Leverkusen, 2021)

2.6.3 Alternative and evolving hydrosocial imaginaries

Imaginaries held by different actors can differ due to their diverging interests, subjectivities, ontologies and epistemologies. This leads, on the one hand, to territorial pluralism in which a territory is imagined and enacted differently within the same geographical and temporal space; and on the other hand, to contestations around imaginaries and territorial practices in time and space.

As societies change, so do ideas of modernity and progress: transforming into new, hybrid configurations. Diverse water actors, knowledges and notions increasingly travel from global to local and vice versa, and incorporate, translate and re-articulate new forefront issues such as ecological integrity, climate change and the role(s) of hydraulic infrastructure. For example, initiatives emerge that imagine and promote nature as a subject with rights ('rights of river' approaches are a clear manifestation of this, see Kinkaid, 2019; O'Donnell and Talbot-Jones, 2018) and where different river barriers are removed (Sneddon et al., 2017). These tendencies represent an arena of both changing modern imaginaries as well as overtaking alternative or counter-imaginaries. Dynamically, they overhaul what Scott (1998) called "high-modernism" (because of changing onto-epistemological contexts and because of changing power constellations).

Pfaffenberger's work (1992) is inspiring to understand different types of reactions that challenge technologies such as water infrastructures. He states that adversely affected people may engage in strategies to alter either the artifact itself, or the myth and context surrounding it (Pfaffenberger, 1992: 282). He shows how every technology is sustained by specific myths, social contexts, rituals and discourses, which can then become contested by affected people who strive for recovering self-esteem, water access or power. For example, dominant discourses and moral norms surrounding an infrastructure might be challenged or reinterpreted so that people's repositioning with respect to the infrastructure becomes morally possible and legitimated (Aubriot et al., 2018; Illich, 1985; Winner, 1993). Other kinds of "counterstatements" (Pfaffenberger, 1992: 286) can be directed towards questioning the paradigms on which technologies have been designed, or directly aim for small-scale modifications of artifacts for example through manipulating components. Thus, struggles surrounding hydraulic infrastructure and hydrosocial territories take diverse forms and challenge different aspects ranging from the materialities of infrastructure to the imaginaries, discourses, myths, knowledges and subject positions entangled with them (see for example Duarte-Abadía et al., 2019; Shah et al., 2019; Veldwisch et al., 2009; Warner et al., 2017).

The tension between hydraulic infrastructure's material stability on the one hand, and its flexibility on the other hand, is clearly reflected in the dynamics surrounding dam removal which questions the status quo of dams being immovable and fixed materializations of modern socio-technical imaginaries (Brewitt, 2019; Fox et al., 2016; Jørgensen, 2017). With time passing, infrastructure aging and environmental legislation and ideas about nature-society relations (or 'socionatures' (Swyngedouw, 1996; cf. Nightingale, 2018) changing, suddenly it seems that also already constructed dams are again (or have indeed always remained) open for contestations. Such opportunities are expression of, and in turn provide fertile ground, for anti-dam movements, alternative imaginaries and changing subjectivities. For example, Brewitt (2019) in his study of three dam removals in the US analyses how communities' subjectivities have changed in the process: from communities that define themselves with and through a dam and accordingly protested removal plans for many years, to communities that reconstitute their identity in terms of having hosted an iconic dam removal and thereby having contributed to herald a 'new era' of environmental governance. Neither hydrosocial territories nor imaginaries nor subjectivities are ever fixed or uncontested but are in a process of constant making and remaking.

2.7 Conclusions

This chapter aimed to further conceptualize the role of hydraulic infrastructure and embedded imaginaries in making and remaking territory. To do so, I reviewed literature related to hydrosocial territories, infrastructure, imaginaries and subjectivities and brought key insights into conversation with each other. Resulting is a 'medley' of notions that have been developed in parallel in different scholarly fields, yet mostly without being applied conjointly. As I have illustrated with the example of the Rhine rectification works, bringing together these insights from diverse studies helps to specify and scrutinize how hydraulic infrastructure transforms relations between territory, people and materiality. It advances ongoing discussions in political geography and related fields in multiple ways. First, it has brought infrastructure more prominently onto the stage of territorialization processes and studies thereof, indicating how also material and nonhuman concerns need to become more explicitly part of political and scholarly inquiries. The political intertwines human and nonhuman, material and nonmaterial.

Second, relating to the foregone, the engagement of notions that clarify human and nonhuman entwinements calls attention to the interrelated 'layers' that are implicated in territorialization processes and that are material, imaginative, symbolic and intimate all at once. More specifically, I have argued that imaginaries are at the base of territorialization: because they encompass the framework in which life, subjects, objects and their relations are understood and lived; and because they contain normative ideas about 'the right disposition of things'. When fixed in space and time through hydraulic infrastructure's designs and connected knowledge, institutions and norms, new materialities and relations emerge. As shown, one important effect is the creation of subjects and changes in subjectivities. The former through the active promotion of specific subjects in the various phases of infrastructural design, construction and operation; the latter through changes in the physical-material environment that shape how people understand and relate to themselves, human and nonhuman others. Roles, inclusion and exclusion, and the conditions in which subjectivities are formed and lived, are defined.

Third, I have elaborated on the dynamic nature of hydrosocial territories and argued that the intended infrastructural and hydrosocial fix is continuously challenged. Imaginaries, hydraulic infrastructure and subjectivities are tied together in dissipative relations: stable and characterized by a certain order, but at the same time always fluid and in transformation. In that sense, territorialisation through hydraulic infrastructure is not one specific moment in time, but a continously contested process that should be studied throughout time and engaging with different moments.

This fluidity yet materiality is characteristic for water, which makes the study of water and hydrosocial territories insightful beyond the domain of water resources management. It provides a challenging lens to understand both the groundedness and materiality of territories and socio-territorial relations, as well as their multiple scales and dynamism. Following water in all its territorial imbrications with humans and nonhumans – and here, in particular its material, socio-political and onto-epistemological interconnectedness through artefact networks -, challenges us to think through the unresolvable tension between, on the one hand, the grounded and bounded characteristics of territories and fixity of infrastructure and, on the other hand, the fluidity and dynamic nature of water, society and socioterritorial relations. It is not a contradiction that requires resolving, but an indication of the world's complexity we need to recognize. Thinking in terms of hydrosocial territories acknowledges and locates this plurality and seeming inconsistency as inevitable part of our messy reality, as an expression of the multiple subjectivities and relations that each of us embodies and enacts.

The devastation and ruin that had fallen over the land fell over the people, too. Most were too broken to fight the building of dams, the moving of waters, and that perhaps had been the intention all along. But I could see Dora-Rouge thinking, wondering: how do conquered people get back their lives? She and others knew the protest against the dams and river diversions was their only hopes. Those who protested were the ones who could still believe they might survive as a people.

Excerpt from Linda Hogan's novel
Solar Storms (1995: 506–507)

Struggles and competing claims over the Ilısu Dam development in southeastern Turkey

3.1 Introduction: Turkish dam development, GAP and the Kurdish question[5]

Dam construction is a disputed issue worldwide, of high importance for governments, local people and the environment (Boelens et al., 2019; Kaika, 2006; McCully, 2001; Nixon, 2010; Shah et al., 2021; Swyngedouw, 2007). In Turkey, a country that has experienced enormous economic growth in recent years and plays a major regional role for both the Middle East and Europe, large dams have been planned and constructed across the country. A highly controversial scheme is the Southeastern Anatolia Project (*Güneydoğu Anadolu Projesi*, hereafter GAP) comprising 22 dams and 19 hydroelectric power plants in the Euphrates and Tigris river basins (see Figure 1 in Chapter 1 for an overview of the spatial reconfigurations imagined by GAP planners). Besides producing electricity, the dams are designed to deliver irrigation water to 1.7 million hectares of land to boost agricultural production in the region (Yüksel, 2010). Beyond the massive barrier creating a huge water reservoir, these dams branch out in large grids of power cables and canals transforming landscapes, affecting communities in these areas, and mobilizing protest movements.

The last and most controversial dam of the GAP project is the Ilısu Dam, which is designed to store 10,410 hm^3 of water, under which approximately two hundred towns and villages will disappear, affecting about 78,000 primarily Kurdish people (see Figure 1 in Chapter 1 and Figure 7 this chapter) (GAP, 2014; Ilhan, 2009; Ilısu Consortium, 2005; Ronayne, 2005). Provisional plans for a dam on the Tigris River were formulated in the 1950s but it took until 1982 to make a project design (Setton & Drillisch, 2006). It took fifteen more years to find funding and investors, leading to an international consortium of companies to construct the dam. In subsequent years, the consortium's membership changed frequently, as companies withdrew under national and international protests. The construction of the Ilısu Dam officially started in March 2007 and was completed in 2018, with operation initiating in 2019. The present chapter, however, focuses on the pre-construction period (until 2015) in which diverse actor coalitions justified or opposed the project through highlighting different knowledge frames, construction techno-political discourses that supported their respective positions and objectives, and through forming alliances locally, nationally and internationally.

[5] A previous version of this chapter was published as L. Hommes, R. Boelens and H. Maat (2016) Contested hydrosocial territories and disputed water governance: Struggles and competing claims over the Ilısu Dam development in southeastern Turkey, *Geoforum* 71: 9-20.

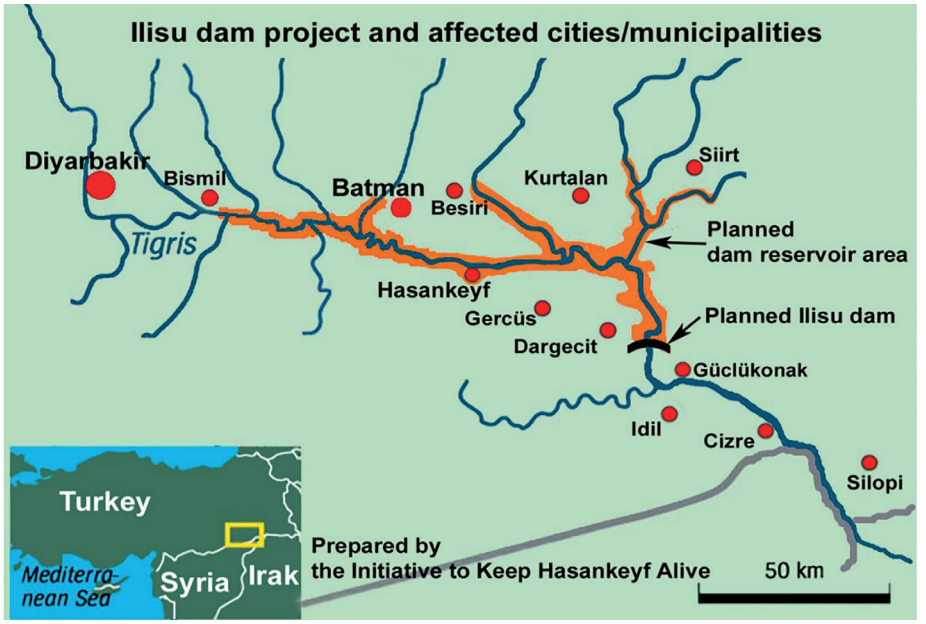


Figure 7 Cities and municipalities affected by the Ilısu Dam project, prepared by the Initiative to Keep Hasankeyf Alive (Eberlein et al., 2010: 295)

The GAP has a history of shifting objectives and realization, from the original focus on hydroelectricity and irrigation in the early 1980s, to an integrated regional development project. Additional objectives were formulated, for example replacing traditional social structures with "modern organizations and institutions" (GAP, no date: Objectives of GAP), reducing infant and child mortality, lowering fertility rates and creating permanent settlements for nomadic and semi-nomadic communities (GAP, no date). Accordingly, multiple social projects addressing, for example, women's empowerment, education and entrepreneurship were planned and partly implemented within GAP. The integrated development program aimed to narrow the socio-economic gap between Western and Eastern Turkey (Çarkoglu & Eder, 2001). Although couched in general development language, the 'Kurdish question' is inescapable in this area: the decades-old and still ongoing struggle between the Turkish government and Kurds living within Turkish national boundaries. Crucial issues involve recognition of Kurdish identity, language rights, equal status under law, and greater autonomy for the southeastern provinces (Harris, 2002; Warner, 2012). The GAP

project, however, swamped issues of ownership and dependency, sovereignty and subordination by the socio-technical complexities of dam construction. The regional context has led scholars to argue that GAP is a mechanism for the Turkish government to gain control and legitimacy in the southeastern regions in various ways (Çarkoglu & Eder, 2001; Harris, 2002; Morvaridi, 2004). In a narrative considering the region's low socio-economic development status as the root cause of the 'Kurdish problem', GAP is depicted as a way to pacify the region through economic development (Harris, 2008). Furthermore, GAP implies increased presence of state organizations, legitimizing state authority and thereby increasing local populations' dependence on state institutions (Harris, 2002; Jongerden, 2010; Özok-Gündoğan, 2005; Warner, 2008). Such greater dependence on the Turkish state is expected to undermine the power of the Kurdish guerrilla group PKK (Kurdistan Workers Party).

The transnational dimension of the GAP project is another related source of its (geo) political importance and sensitivity (Bagis, 1997; Warner, 2012). The Ilısu Dam is on the Tigris River, 40 km north of the Turkish–Syrian border and 90 km upstream from where the river enters Iraq. The three countries' national borders cut across the Kurdish region, providing a context in which politics and water are deeply intertwined and Turkey, controlling regional water resources, wields strategically important power in negotiations with neighbouring countries. In 1987, for example, Turkey urged Syria to end PKK activities within Syrian borders in return for guaranteeing an annual minimum flow of water (Jongerden, 2010).

Regional developments, in particular the escalating conflicts in Syria, Iraq and other neighbouring countries, have added to the political dynamics. Turkey's upstream dam-building efforts faded into the background (Schwarzstein, 2014); negotiations about constructing hydraulic infrastructure in Turkey attained less priority for the Iraqi and Syrian governments, and both lack geopolitical power to forge an effective agreement with the Turkish government about Euphrates and Tigris water resources.[6] These rivers have gradually become 'normalized' in international discourse as a 'Turkish resource' providing the government with political leeway to materialize its hydrosocial territory and control water flows (Harris & Alatout, 2010; Warner et al., 2014).

[6] Interview representative Save the Tigris, 17.02.2015

This chapter draws on the notion of hydrosocial territories to analyse the intrinsically socionatural and techno-political relationships underlying and constituting the mega hydraulic development of the Ilısu Dam. It furthermore brings in Foucault's notion of governmentality (Foucault, 1991, 2008) to show how the dam is not only an instrument for the Turkish government to govern water and to 'govern people through water' but is also used by protest groups to create a counterforce and alternative plans (Boelens, 2014; Bridge & Perreault, 2009; Swyngedouw, 2009). The Ilısu Dam and the discussions and struggles surrounding its hydrosocial patterning give insight into the multiplicity of actor coalitions involved and the divergent dam imaginaries (Jasanoff & Kim, 2015; Kaika, 2006; Swyngedouw & Williams, 2016) that link socio-economic, cultural and political facets in particular ways, showing the political nature of technology. The conceptual notions of hydrosocial territoriality and governmentality are discussed in the next section. Next, the Turkish government's hydropolitical imaginary is reconstructed, followed by analysis of actor coalitions and the diversity of counter imaginaries around the Ilısu Dam promoted by them. The penultimate section examines perceptions and responses of people living in dam affected areas, and the final section discusses results and draws conclusions.

3.2 Hydrosocial territories, governmentality and contested techno-political imaginaries

Similar to experiences in other countries, dam development in southeastern Turkey is framed in a strongly de-politicized language of overall progress, sustainable, clean development and efficient, rational water management (Birkenholtz, 2009; Duarte-Abadía et al., 2015; McCully, 2001; Sneddon & Fox, 2008). This disregards competing claims and conflicts over water, landscape and hydropower development and related struggles over socio-cultural issues, problem definitions, knowledge frameworks, ontological meanings, decision-making and preferred solutions. Viewing the Ilısu Dam in terms of hydrosocial territories and governmentality can enhance understanding how water control is embedded in the broader (multi-scale) political context of governance over and through socionatures.

As indicated in the definition I have provided in chapters 1 and 2, the notion of hydrosocial territories views water flows and management as physical, social, political and symbolic matters, entwining these domains in particular configurations, actively constructing and producing territoriality in techno-political and socio-ecological

interactions (Boelens et al., 2016; Swyngedouw & Williams, 2016). This means that territories are not just geographical places but imagined spaces that model actively created places (Agnew, 1994; Baletti, 2012; Elden, 2010). Imagined spaces and the changing reality on the ground become a mixed zone, time- and location-specific, where rules about water management, decision-making, meanings and discourses are profoundly contested and negotiated. Rather than constituting separate entities that 'interact', humans and nature influence and produce each other in multiple ways and on multiple scales (Barnes & Alatout, 2012; Baviskar, 2007; Harris & Alatout, 2010; Latour, 1993, 2000; Linton & Budds, 2014).

So-called 'integrated' or 'hydraulic' projects are means to configure and re-configure hydrosocial territories, altering the physical–ecological, socio-economic, cultural-symbolic and political spaces where they are realized. As a result, hydrosocial territories entail the impact of water flows through (mega)hydraulic artefacts with major effects for different user groups' physical and ecological environment, and also aim to modify the political order, worldviews, and ways in which people represent themselves and others in relation to nature, as well as the ways in which these social–political norms, morals and hydro-cultural relations become embedded and materialized in hydraulics, artefacts and technological network relationships – i.e., the 'moralization' of (hydro) territorial infrastructures (Anders, 1980; Dixon & Whitehead, 2008; Foucault, 1975; Shah & Boelens, 2021; van Dijk, 2000; Verbeek, 2011; Winner, 1980).

Dominant hydrosocial configurations commonly entwine technological, industrial, state-administrative, and scientific knowledge networks that enhance local–global commodity transfers, resource extraction, and development responding to non-local economic and political interests. To do so, they commonly curtail local sovereignty and create a political order that makes these local spaces comprehensible, exploitable and controllable (Büscher & Fletcher, 2015; Meehan & Moore, 2014). Hydrosocial territorialisation, historically, has often been imposed top-down, explicitly manifesting the coercive forces of governments and dominant interest groups, for example by combining legal, military and economic compulsion, which Foucault (Foucault, 2008: 313) calls "government according to sovereign power", or by constructing dominant mythical-religious representations, termed "government according to truth". Modern forms of government rationality aiming to control subject populations apply more subtle techniques of governance – such as moralizing-scientific "disciplinary governmentality" and market rationality-based "neoliberal governmentality" (Foucault, 2008: 313). They aim for 'subjectification' in which subjects come to adopt the dominant discourse and

consequently turn themselves into self-disciplining, obedient citizens of the ruling system (Foucault, 1975, 1991; cf. Dean, 1999; Escobar, 2011).

In such moralized and moralizing techno-political geographies, ruling groups deploy, and subjugated groups gradually come to adopt, discourses that define and position social and material issues in a human-material-natural network that leaves the political order unchallenged and stabilizes ways of 'conducting subject populations' conduct' (Foucault, 1991). Thus, the effort is to simultaneously govern water-through-mentality and mentality-through-water, rather than water as such, and by that to make people govern ('correct') themselves, in accordance with the socionatural, hydro-territorial imaginaries of the ruling (Duarte-Abadía & Boelens, 2016; Ioris, 2016; Perramond, 2016; Swyngedouw & Williams, 2016; Zurita et al., 2015). Making such 'new subjects' requires these water users to frame their worldviews, needs, strategies and relationships differently, building and believing in new models of agency, causality, identity and responsibility (for Turkish governmentalization, see also Secor, 2007). Such frames also exclude other options and thus "delimit the universe of further scientific inquiry, political discourse, and possible policy options" (Jasanoff et al., 1998: 5).

As this mechanism of "capillary/inclusive power" in water politics and natural resource governance is less visible but often extremely effective (Boelens, 2009: 324), its disclosure has strong relevance (Bridge & Perreault, 2009; Büscher & Fletcher, 2015; Ferguson & Gupta, 2002; Vos & Boelens, 2014). In the GAP project, governmentality is central as Turkish state authorities aim to use water resources to irrigate and generate electricity and to shape the project region's socio-economic and cultural territory according to a certain cultural–political imaginary. For example, presenting the GAP region as a place of agro-industrial potential, envisioning it as the Middle East's 'breadbasket' and at the same time emphasizing the region's low Human Development Index, suggests that making people and their territory part of Turkey's broader neoliberal project will bring wealth and development. Thus, people's perceptions of what is morally 'good' and what 'ought to be done' (and what not) are formed to make them supporters of GAP – or at least non-opponents. At the same time, it adds to the project of nation-building, actively producing subjects and citizens by altering hydrosocial territory (cf. Jessop, 2007).

As Rodriguez-de-Francisco and Boelens (2015) and Seemann (2016) demonstrate, territorial governmentality projects do not necessarily aim to obliterate alternative territorialities. Most often, as in the Turkish case (Harris, 2012; Secor, 2007), modern

territorialisation tactics aim to recognize, incorporate and discipline local territorialities, integrating local norms, practices, and discourses into its mainstream government rationality and its spatial/political organization. This subtle strategy to incorporate and marginalize locally existing territorialities in mainstream territorial projects makes use of 'managed' or 'neoliberal multi-culturalism' (Assies, 2010; Hale, 2004): "through 'participatory' strategies it recognizes the 'convenient' and sidelines 'problematic' water cultures and identities" (Boelens et al., 2016: 7).

As a consequence, in everyday political practice, despite efforts by ruling groups to make one discourse and one techno-political imaginary hegemonic, it is common to find multiple competing territorial imaginaries and hydrosocial territorial representations dynamically taking shape within one and the same geographical–political space (Hoogesteger et al., 2016). Particular territorial imaginaries become contested and disputed by counter-imaginaries attempting to establish a different frame of meanings, problems, solutions and possibilities. "All of these compete, superimpose, and foster their territorial projects to strengthen their water control. These overlapping hydro-political projects generate 'territorial pluralism' and continuously transform the water arena's hydraulic grid, cultural reference frames, economic base structures, and political relationships" (Boelens et al., 2016: 8). Building and materializing counter-imaginaries can take place in different ways, depending on the strategies deployed. Struggles for alternative territoriality often involve building and engaging in new multi-scale networks, which link local communities and territories with translocal actors, strategies and alliances (Marston, 2000; McCarthy, 2005; Swyngedouw, 2004; Swyngedouw & Heynen, 2003). Alliances may form among actors who are not linked directly or materially through water flows but connect by constructing territories and imaginaries on extended scales (Budds & Hinojosa, 2012; Warner, 2012). Constructing imaginaries may often be strategized to reach desired goals, making their creation an instrument and/or a necessity for success rather than an evident course of action.

3.3 Opposing coalitions and diverging imaginaries

3.3.1 The hydrosocial territory of Turkish state authorities

The Turkish government's determination to build the Ilısu Dam has been substantial from the start. Despite protests and difficulties to access financial resources from third parties, Veysel Eroğlu, former Minister of Forestry and Water Works, put it boldly: "we [the Turkish government] do not need their money. We will construct this dam at

any cost" (Eroğlu cited in Ilhan, 2012:5). The Ilısu Dam will complete the GAP project and is thus considered a national priority. The forms of governmentality, ranging from capillary to top-down strategies and techniques, are largely sustained by a positive, inclusive discourse portraying the dam as a "symbol of national pride" and a "vision of a 'great' Turkey" (Çarkoglu & Eder, 2001: 42, 65).

The official narrative imagines numerous advantages the dam will bring for the Turkish nation, local people and even for neighbouring countries. First and foremost, it emphasizes that the dam will help cover Turkey's growing energy demand, decreasing dependence on energy imports (Ministry of Foreign Affairs, no date). This justification is backed by an imaginary of energy as scarce and water as relatively abundant, so that hydropower development seems a 'logical' action to take. Furthermore, it claims that the Ilısu Dam promotes local employment in construction, improved local availability of electricity, and better infrastructure such as roads. All this will kick-start local economic development (Ilısu Consortium, 2005). As Harris (2009) shows, given that southeastern Turkey was long ignored by public and private investment, many welcome state support for local economies. However, whereas many GAP dams are designed to facilitate irrigation to turn the region into a 'bread basket' and foster local agricultural development, this aspect is largely missing from the Ilısu project where the 'water for energy' imaginary prevails.

This imaginary is embedded in a wider vision of Ilısu being indispensable for national development. The fact that local benefits are actually marginal confirms what Nixon (2010: 62) observes: that in order to construct mega dams, local communities are unimagined, thus excluded or shoved to the background of a broader but "highly selective discourse of national development". Such imaginaries of benefits and development, which assign local communities a sacrificial role for the greater common good, are characteristic for hydraulic mega projects (Duarte-Abadía et al., 2015; Kaika, 2006; Nixon, 2010). The subtle imposition of the dam-building coalition's particular perspectives on the GAP and Ilısu hydrosocial territories constitute a politics of truth, legitimizing certain water knowledge, practices and governance forms while discrediting others. They separate 'legitimate' forms of hydraulic knowledge, territorial rights and people's organization from 'illegitimate' forms (cf. Forsyth, 2004; Foucault, 2007). As a result, production of hydro-territorial knowledge and truths – and the ways these shape particular water artefacts, rules, rights and organizational structures – concentrates on aligning local villages and livelihoods with imagined multi-scale water-power hierarchies (Boelens, 2009, 2014).

Discussions and imaginaries concerning 'civilization' are essential. In the Ilısu Project, the state is depicted as the centre of expertise versus traditional, backward local people, needing modernization (Harris, 2008). The territorial governmentalization project will fundamentally alter local people's identification with existing community and socio-cultural organization, in order to change how people belong and behave, according to new identity categories and hierarchies. This vision becomes clear in one target of the GAP Social Action Plan: "to enhance the presence and influence of modern organizations and institutions in order to remove those traditional ones that impede development" (GAP, no date: Target 1). Likewise, GAP will bring "civilization back to Upper Mesopotamia" (GAP, no date: History of GAP). This vision is supported by demographic data portraying southeastern provinces as lagging behind other provinces socio-economically (GAP, no date). Calling the area backward devalues local knowledge and opinions and creates an imaginary portraying state culture as 'progress' and 'development'. In this discourse, people 'who want development' must also become civilians of the Turkish state, creating a self-disciplining mentality.

The above cultural policies materialize in plans to resettle populations in centralized villages (see Figure 7 for an overview of affected villages and Figure 8 for the constructed resettlement site "New Hasankeyf"). Governmental design choices are embedded in and justified by specific ideas about how 'modern' people should live and how state services can be delivered, namely in central villages. Dispersed rural settlements in the area are, by contrast, portrayed as difficult to control and as possible breeding-ground for social unrest. This imagines the area's repatterning through physical structures such as the dam and new houses and villages to reconfigure the region's socio-cultural and economic makeup.

Socio-cultural and territorial re-patterning through specific resettlement designs was not originally part of the Ilısu Dam project but was included later, when European banks and companies got involved and applied for export credit guarantees in their respective home countries. For their applications, project planning authorities were urged to prepare environmental impact assessments and resettlement plans, which then forced Turkish authorities to actually design resettlement sites such as New Hasankeyf. Export credit agencies intended this to reduce the dam's negative local effects, but these documents then materialized government authorities' views and hydrosocial imaginaries about the region, the local population, the dam project and their future.

Figure 8 Aerial view on New Hasankeyf (Kilic in Frankfurter Allgemeine Zeitung, 2020)

In the official narrative, however, resettlement plans merely 'scientifically' and 'objectively' support the previous idea that local people long for and need drastic change, which the Ilısu Dam project can bring. For example, in 2005 the General Directorate of State Hydraulic Works (DSI in its Turkish acronym) and the Ilısu Consortium, then comprising German, Austrian, Swiss and Turkish investors, published a resettlement action plan with quotes local voices mostly in favour of the dam: "Yes, I really want the dam to be constructed", "We have a terrible life here. In addition to this, new jobs will be created. Why wouldn't we want it?" or "Let them [the Turkish government] save us from here, so that we will have civilization" (DSI & Ilısu Consortium, 2005: 44). This builds a certain 'truth' and on-the-ground 'reality' supporting the state's and consortium's hydro-political imaginary, to help realize and materialize it. This is not to say that these accounts are invented. Geographer Leila Harris (2012) shows how many local population groups have high expectations for the region's economic betterment through GAP. Building on hope, expectations and discursive inclusion engages local people in the narrative about a better future (cf. Suhardiman & Karki, 2019). Dam opponents, however, contest and criticize the creation of such hope and

expectations, arguing that resettlement areas are unsuited for sustaining people's agriculture-based livelihoods and that job creation will be marginal, if at all.[7]

The above does not mean that the Turkish state is a hegemonic and homogenous power that simply desires to suppress or assimilate Kurdish populations through the project and specific resettlement designs. Rather, official state policies regarding the Kurdish issue have changed over time and have moved away from straightforward assimilation policies. Instead, the current AKP Government embraces a multiculturalist discourse in which ethnic sub-identities are acknowledged and seen to be connected under an umbrella-like Turkish citizenship (Saracoglu, 2009). Such cultural policies of recognition are reflected in government plans stating, for example, that there are "people of different ethnic origins in the region" (Ministry of Foreign Affairs, no date: The Ilisu Dam) and that "local sub-culture elements may form a positive synthesis with the national culture" (GAP, no date: Objectives of GAP). Such acknowledgement is, however, highly selective; establishing what is the national culture and what are sub-ethnicities: a governmentality expression that deeply reflects the above-mentioned 'managed multi-culturalism' (cf. Assies, 2010; Hale, 2011). Furthermore, though this quote shows recognition of cultural and ethnic differences, relative numbers of present ethnic groups are not addressed (in the five provinces affected by the Ilısu Dam, ethnic Turks and Arab groups are much smaller in size than the Kurds (Morvaridi, 2004)). Thereby, the Kurdish issue is left out of the dam imaginary, ignoring claims by scholars or anti-dam campaigners that the Ilısu Dam is highly political because the area is mainly inhabited by Kurds (Bagis, 1997; Harris, 2002; Jongerden, 2010; Ronayne, 2005). The project's political character is neutralized and instead portrayed as one-dimensional, generating energy and development. Excluding or including the dam's Kurdish dimension in discussions can include or exclude population groups and potential dam opponents, as explained in the following section.

Another important aspect of Turkish state authorities' hydrosocial territory and imaginaries associates the project area with notions of 'insecurity' and 'threat'. This makes the Ilısu Dam part of a wider security imaginary and narrative that recurs throughout Turkish politics (Warner, 2012). The dam is portrayed as a means to ensure Atatürk's principle of 'Peace at home, peace abroad', referring to both the Kurdish problem and Turkey's relations with its neighbours (GAP, no date; Ministry of Foreign Affairs, no date) enhancing the area's security in several ways: socio-economic

[7] Interview representative Doğa Derneği, 11.05.2013

improvements in the GAP region are expected to eradicate part of PKK's support (Harris, 2002); expanding infrastructure while constructing the dam will make the area more accessible to government administration and military activity; and flooding the area would deprive PKK of important hide-outs (Jongerden, 2010). This could also be a reason why the government chose to construct one huge dam instead of several smaller ones. However, the official design choice argument is that it is economically more efficient and profitable to build one single big dam (Ilısu Consortium, 2005). Within this (in)secure territory, water is imagined as an 'actant' (Callon, 1992; Latour, 1993) both as a border, aiding the Turkish state's physical integrity, and as a point of access for military activity. Reconfiguring territory, here in spatial terms, is therefore a way of governing people through water and not just governing water itself.

The security discourse is also reflected by officially framing anti-dam struggles as 'separatist' or 'terrorist' (Eberlein et al., 2010; Ronayne, 2005). The terrorism discourse, shaping the normative divide between legitimate and illegitimate thinking and knowledge repertoires, runs through many other Turkish political discussions as well. Interestingly, people opposing the dam follow suit. For example, a resident cited in Ronayne (2005: 85) calls the authorities responsible for flooding Hasankeyf "terrorists of history". Hence, the same vocabulary is used to contest the other's imaginary, showing how different imaginaries within a single territory directly interact with each other.

3.3.2 The emergence of opposing coalitions and diverging imaginaries

The Ilısu Dam project and the dominant hydro-political imaginaries constructed around it by Turkish state authorities, triggered responses and counter-forces from a wide array of stakeholders. Symbolic–discursive pluralisms and materialized territorial imaginaries evolve through multiple socio-cultural, political and economic projects and projections within the dam's territorial reconfiguration. This case has a particularly high diversity in imaginaries and representations mobilized by dam opponents, to challenge technocratic discourses portraying the dam as an undisputed necessity for Turkey's energy policies. The main opposing imaginaries about hydrosocial territories are: Kurdish, environmentalist and international. This is not to say that, for example, all Kurds view the dam in the same way, but rather to point out how different dam dimensions such as the 'Kurdish dimension' (arising from the project region's ethnic makeup) involve Kurdish stakeholders. While maintaining their own thematic focus toward the Ilısu Dam, the different Kurdish, environmentalist and international groups link up to form coalitions reinforcing their parallel (but not identical) struggles. As with Evren's (2014) observation on the anti-dam campaign in Yusufeli, anti-Ilısu campaigns

are highly dynamic, evolving, rising and declining with time as different dam dimensions are emphasized at different times, involving a variety of coalitions and concomitant imaginaries in the struggles (cf. Shah et al., 2021). Each constructed imaginary justified actors' involvement in the struggle and addressed different audiences.

Kurdish hydrosocial territory

The earliest opposition against the Ilısu Dam came in the 1990s from Kurdish activists, academics and diaspora devoted to overall protection of Kurdish rights in the region, e.g. the UK-based Kurdish Human Rights Project (Kurdish Human Rights Project, 1999). Most dam-affected people are Kurds, so flooding the area is by some interpreted as deliberately erasing part of Kurdish history and culture (Ayboğa, 2009): "Here is being drowned Kurds' equivalent of national archives, national museum, and national library, not to mention their single most important deed to their native land" (Izady, 1996). This image shows the enormous physical and symbolic power attributed to the dam and its water, to de-link the present from the past by re-configuring the environment and considerably altering people's relationship to their territory, history and cultural background. Such a break with the past, 'erasing' the existing socio-environment to generate space for new, 'pure and unspoiled' territorial configurations, is part of wider utopia-inspired hydrosocial traditions (Achterhuis et al., 2010; Boelens & Post-Uiterweer, 2013). This, together with forced displacements and major conflicts in the 1960s and 1980s, makes this struggle even more essential for Kurdish rights groups. More than just hydraulic infrastructure, the dam represents yet another violent occasion in which the Turkish state once again exerts physical, political, symbolic and discursive power over the dominated Kurdish regions.

However, claims about the area being inherently Kurdish are challenged by the Turkish government, and altered by some dam-opposing organizations. Turkish authorities have not yet acknowledged any specifically Kurdish cultural claims to Hasankeyf or the Ilısu project area but emphasize that different civilizations have lived in the Tigris Valley in the past (GAP, no date). Second, Turkish environmental organizations stress the area's importance for the whole Muslim world rather than only for the Kurds because an important imam's tomb is there (Ronayne, 2005).[8] Other international organizations, such as the Damocracy Movement, argue that Hasankeyf and the Tigris Valley hold value for the global community because of the ecosystem and archaeological sites documenting early human civilizations (for example Ahunbay & Balkiz, 2009;

[8] Interview representative Doğa Derneği, 11.05.2013

CounterCurrent, no date; Shoup, 2007). Their claims do not contradict each other, but emphasize different dimensions and characteristics of the dam's hydrosocial territory, to reach a broader audience. Eberlein et al. (2010) confirm that Turkish and international celebrities (in the campaign from 2007 onwards) re-framed the dam project, de-emphasizing 'Kurdish' dam dimensions to get Turkish society as a whole involved. This move was tactically necessary since parts of Turkish society now recognize Kurds but exclude them from their conceptions of society (Saracoglu, 2009). Imaginaries are thus strategically constructed and instrumentalized so that respective constituencies can feel part of the hydrosocial territory and become involved.

Finally, rather than focusing on positivistic factual truth about the area's historical relevance for different communities and cultures, it is fundamental to acknowledge that perceiving the area as Kurdish involves Kurdish stakeholders in the hydrosocial territory debate. Confronted with the threat of the Ilısu Dam, parts of the Kurdish community, although physically distant, feel strong belonging to the area and thus engage in anti-dam protests. Harris (2008) argued that state practices to unify and nationalize Turkish territory might encourage and reinforce Kurdish identity formation. An apparent example of border-crossing Kurdish involvement is the above-mentioned Kurdish Human Rights Project, defining the Ilısu Dam hydrosocial territory in terms of Kurdishness and justifying their involvement on grounds of territory and ethnicity (Kurdish Human Rights Project, 2009). The involvement of the Kurdish diaspora in the US and Western Europe played a crucial role in advancing scalar politics by setting up key alliances between local and global NGOs and raising awareness about the project globally (Ilhan, 2009).

Environmentalist hydrosocial territory

Following advocacy work by Kurdish human rights groups, an environmentalist perspective enlarged the Ilısu project hydrosocial territory, focusing the dam's potential impacts essentially, though not exclusively, on negative environmental impacts. Destruction of 400 km of ecosystem, loss of endangered species, deteriorating water quality and increasing risks of diseases such as typhus and malaria are just a few named by different organizations (for example Ahunbay & Balkiz, 2009; CounterCurrent, no date; Doğa Derneği, 2006).

Many environmental organizations have included the Ilısu Dam in their broader campaigns: for example the Damocracy Movement took the Ilısu Dam into their political and symbolic–discursive struggle to challenge labelling of hydropower as 'green' energy. A representative of Doğa Derneği, one of the member organizations,

explained that they chose two representative dams for their campaign: the Ilısu Dam and the Belo Monte Dam in the Brazilian Amazon, illustrating how an organization embeds local struggles globally.[9]

Time wise, it is interesting that Doğa Derneği, Bird Life International's Turkish partner, joined the anti-dam struggle only in 2007, the year that the ECAs of Germany, Austria and Switzerland approved the project in principle. Considering that the anti-Ilısu struggle started in the 1990s, 2007 seems rather late. Thus, the dam's environmental dimension was incorporated into struggles and alternative hydrosocial territory imaginaries much later than the Kurdish dimension.

Similarly, as ecological conditions got environmentalists involved, the dam-affected area's many archaeological sites involved archaeologists. In 2005, a fact-finding mission by the Kurdish Human Rights Project with Irish archaeologists clearly took a position against the dam (Ronayne, 2005). The archaeologists were involved by an earlier complaint against then of the dam at the 2001 World Archaeological Forum as "a form of ethnic cleansing in which governments and companies would have been complicit" (World Archaeological Forum, 2001: 1). A clear politicization of archaeology indicates how science engages in politics and how discussions about technologies and their impacts are argumentative processes rather than simply 'truthful scientific facts'. This also illustrates how the struggle for a certain hydrosocial territory (to preserve the place's specific ecological and cultural richness) and against the configuration suggested by the government can connect actors with each other and to infrastructure, place and the Tigris River in networks that would not have emerged without the common struggle.

To counter the claim of losing valuable archaeology, the Turkish government claims that dam plans have in fact led to state-sponsored salvage excavations which would otherwise not have happened (Ministry of Culture and Tourism, no date). Responding to critics, they maintain that many archaeological sites can be saved and rebuilt in the 'New Hasankeyf Open-Air Cultural Park' giving a place for archaeology (albeit relocated) in the new hydrosocial territory. Many dam-opponents argue that artefacts are difficult to transport, will lose their importance once detached from their natural environment and territory-of-belonging, and that the Cultural Park is not likely to attract many tourists (CounterCurrent, 2011; Ilhan, 2009; Shoup, 2007).

[9] Interview representative Doğa Derneği, 11.05.2013

Integrating and upscaling hydrosocial territories

The capital- and knowledge-intensive nature of the Ilısu Dam urged the Turkish government to search for funding and expertise abroad, bringing together different consortia with construction companies and investors from, among others, Germany, Switzerland and Austria. This direct foreign involvement upscales and enlarges the Ilısu Dam's hydrosocial territory, making new actors relevant and the dam debate international. Involving European companies coincided with Turkey's acceptance as a European Union candidate in 1999. Although it is not clear how this acceptance helped unite European companies and the Turkish government, the EU accession process reconfigured the Ilısu project's hydro-politics in several ways.

Most importantly, foreign companies and investors applied for export credit guarantees from their respective national export credit agencies (ECA) which brought European civil-society actors into the anti-dam campaign, especially to hold national companies and their ECAs accountable for investments and actions abroad. The Swiss Berne Declaration, the Austrian ECA and the German CounterCurrent are examples of NGOs that lobbied to cancel export credit guarantees, urging ECAs to demand compliance with international standards (Atzl, 2014; Eberlein et al., 2010). These international standards lifted Ilısu Dam construction hydro- and environmental policies from European to global levels. More specifically, though Turkey had officially rejected World Commission on Dams (WCD) recommendations published in 2000 (Fujikura & Nakayama, 2009) and disregards World Bank standards, this pressured to include them at least partially, since German and Swiss Governments welcomed these recommendations and standards, and took them into account to evaluate the Ilısu project (Eberlein et al., 2010). In effect, Turkish authorities published an environmental impact assessment (EIA) and resettlement plan in 2005, both documents not required by Turkish law. The EIA and the resettlement reports were published just as European companies and ECAs got involved, and EU accession negotiations began officially, suggesting that Turkey's aspiration to join the EU was a major incentive to align dam plans with European and international requirements.

Although the European companies finally withdrew and Turkey decided to self-finance the project (as also happened three years earlier for the Yusufeli Dam (Evren, 2014)), the international anti-Ilısu campaign attracted a lot of attention in Turkey and the contractor countries and temporarily succeeded in stopping Ilısu Dam construction.

The increasingly international 'arena of protest' can, besides the involvement of European consortia, also be explained by the political climate in Turkey. For example, because of the state of emergency in southeastern Turkey until 2002, civil society organizations and state authorities distrust each other, and freedom of expression and association are limited (Setton & Drillisch, 2006).[10]

This made it dangerous to criticize the project in Turkey, and the protest movement was often portrayed as 'terrorist' or 'separatist'. Transnational alliances have provided the anti-dam protest movement with new powers and possibilities.

Such dam opposition coalitions are highly dynamic, using multi-scale, international politics and expanding the issue of dam development both geographically and in 'issue reach'. Politics of scale are therefore not only about characteristics of the environment or resources that determine who is a relevant social actor but also about strategic framing of an issue according to particular scales so that power and authority are reconfigured (cf. Budds & Hinojosa, 2012; Warner et al., 2014). Framing the Ilısu Dam's hydrosocial territory on multiple issue scales involved Kurdish activists, environmentalists and others; involving European investors enabled anti-dam coalitions to frame dam development also as a European affair. Interestingly, the Turkish government continued framing the Tigris' management as an exclusively national concern, depicting the river as being purely Turkish and disregarding its transnational flows or other supra-national dimensions (Warner et al., 2014). This would exclude certain actors from the relevant hydrosocial territory, to weaken international opposition claims. In frames constructed by the Turkish government and dam opposition coalitions, not only hydrological flows define who is in or out of the respective hydrosocial territory. Accordingly, scalar policies play a decisive role in negotiations and struggles surrounding Ilısu Dam development and create diverging territorial imaginaries.

Although ignored by the nation-based discourse and imagined community constructed by the Turkish government, the diverse existing and newly forged local-national-regional scales become increasingly relevant and important. The transboundary nature of the Tigris and Euphrates river basin caused tensions among Iraq, Syria and Turkey, also leading international institutions (such as the World Bank) to refuse to fund dam construction (Harris, 2002). Tensions are about Turkey's possibility to 'turn off the

[10] Interview representative Initiative to Keep Hasankeyf Alive, 25.06.2013

tap', expected negative impacts on downstream agricultural activity as well as about politics concerning the Kurdish question. Turkish authorities, however, argue that the Ilısu Dam will not negatively affect water quality or quantity, as it is not constructed for consumption such as irrigation but for hydropower and drought and flood control (Ministry of Foreign Affairs, no date).

Interregional water dependence also links the anti-Ilısu Dam movement's success with organizations in the region. In the 1990s and early 2000s, anti-dam protests found good allies in Syria and Iraq, but opposition became more difficult in 2006 when relations among the three countries improved (Warner, 2008). While later newly resurging regional instability and conflict severely changed high-level political relations once again, it still remained difficult for the anti-Ilısu Dam movement to find allies in the two neighbouring states. Nevertheless, in the past ten years of struggle, the Turkish local level has been linked with the most affected area in Iraq, as both the Ilısu Dam project area and the marsh lands in Iraq are home to minorities. Marsh Arabs have, like the Kurds, experienced much oppression because of their ethnic identity in the past and now see their livelihoods threatened by the Ilısu Dam (Çarkoglu & Eder, 2001). Those factors, and efforts by organizations to engage in scale politics and promote transnational solidarity, have led to joint efforts and actions. For example, in May 2012 marsh Arab tribal leaders travelled to Hasankeyf to announce their solidarity with the anti-dam struggle and jointly sign a declaration against dam construction (RiverWatch, 2012). Furthermore, Iraqi environmental organizations participated in the 'World River Conference' organized by the Damocracy Movement in May 2013 in Istanbul.

In short, a number of diverging imaginaries about hydrosocial territories encapsulate various constellations of actors, landscapes, science and technology. Certain coalitions engaged in the anti-dam struggle are united by a common goal. Yet, the common goal of preventing the Ilısu Dam is for each one of them part of a broader campaign, connected to divergent underlying interests, views and representations – for example, the misperception of dams being green energy, injustices inflicted on the Kurdish people, and privatization policies in Turkey. This does not devalue the anti-dam struggle; rather, it shows how the multi-dimensionality of a hydro-political project unites groups and stakeholders from different backgrounds. It also shows that there is no simple 'truth' about the Ilısu Dam but that everybody constructs their own techno-political and hydrosocial imaginary, shaped by the broader context, personal position and discourses about the region and dam development.

While previous sections have examined the different stakeholders opposing the dam, the following section focusses on the positions of local people. Representations from dam opposing organizations about the local population affected by the Ilısu Dam do not always cover actual views and identities of the people and their dam imaginaries. Rather, local engagement with dam opposition coalitions is ambiguous and has fluctuated with time, being sturdier at the beginning of the struggle and transforming into widespread resignation as years passed by. The following section provides further detail, outlining how the Ilısu Dam was imagined to reconfigure the hydrosocial territory locally and then elaborating on actual local involvement in the anti-dam struggle and engagement with associated imaginaries. Finally, a brief overview of the latest developments in the region is provided.

3.4 Local involvement and emerging dynamics

Non-governmental organizations estimate that there are around 78,000 people living in the area to be affected by dam construction (CounterCurrent, 2011). Several concerns exist regarding local impact of the project: compensation eligibility criteria, compensation sufficiency and disadvantages for women, landless people and people displaced by the Turkish–Kurdish conflict (Cernea, 2006; Morvaridi, 2004; Ronayne, 2005). The overall doubt is whether people will be enabled to restore their livelihoods after resettlement.

Accounts differ regarding local people's own imaginaries about how the dam will reconfigure their territory as well as the degree to which their views were consulted and taken into account by decision-makers. Dam-opponents argue that there was no satisfactory consultation, while the government says there has been plenty of participation (DSI & Ilisu Consortium, 2005). Similarly, dam-opposing organizations agree that most local residents oppose the dam (Setton & Drillisch, 2006) while the government's resettlement plan states that people welcome the dam as an opportunity for new jobs and to escape poverty (DSI & Ilisu Consortium, 2005). Although such accounts must be viewed carefully, some local groups do directly profit from the dam. For example, owners of large estates had the chance to receive considerable expropriation money for their land, as have people owning land close to the construction site where property values have increased considerably (Morvaridi, 2004; Ronayne, 2005). Such a timely increase in land values, for better or for worse, has also been observed in other dam-affected areas (e.g. Evren, 2014).

Accounts about the local population's involvement in struggles against the dam are ambiguous. Especially before the Ilısu project was nationalized in 2010, grassroots protest actions involved, for example, dam-affected people handing over 1500 signed letters to European embassies in Ankara (2008) or a local delegation meeting European ambassadors in person (2009). Scheumann et al. (2014) also argue that people expressed their dam opposition by voting for dam-opposing parties (such as the Kurdish Peace and Democracy Party) which, however, also represented other 'Kurdish concerns' beyond the dam issue. Nevertheless, some organizations also expressed their resentment about the sometimes missing preparedness of local inhabitants to actively participate in anti-dam protests.[11] This could, among other things, be due to the larger social context which makes that people who oppose the dam might be scared to openly express criticism, also considering the fact that anti-dam activists have been arrested in the past.

At the same time, Hasankeyf residents criticized organizations prioritizing environmental and archaeological issues over people and their poverty and Elma (2013: 4) notes that "arguments by [...] activists [...] are often situated at a stereotypical rhetoric level that seems out of touch with the local community's fears and aspirations".[12] This suggests that local residents actively engage with the imaginaries employed by dam-opposing organizations, while they do not necessarily hold the same view or feel represented by them. In the mentioned interview and the evoked dam imaginary, for example, potential economic benefits prevailed over ecological threats or Kurdish rights concerns.

Time can also change local attitudes and involvement. The Ilısu project hanging like a sword of Damocles over the area for decades led to mental stress and to de-politicizing the project as the local population longed for certainty. This fed acceptance and 'de facto' self-correction by the local population in accordance with the construction interests. Actions by the anti-dam movement prolong waiting and uncertainty, eroding local support for the movement as local people have to cope with uncertainty every day. This happened with the anti-Yusufeli Dam campaign (Evren, 2014) and is also confirmed by several sources for the Ilısu case. For example, a Doğa Derneği

[11] Interview representative Doğa Derneği, 11.05.2013
Interview representative Initiative to Keep Hasankeyf Alive, 25.06.2013
[12] Interview resident of Hasankeyf, 21.06.2013

representative said "They [the local people] are tired and bored now; they want a final decision"[13] and a newspaper article titled "Hasankeyf locals stuck in limbo" cited a Hasankeyf resident: "The people here are tired. For decades, they heard there was going to be a dam [.. .]. They lost patience. Many of them have told me, 'If we have to go, if we are going to lose this place, let's do it as quickly as possible'" (Today's Zaman, 20 January 2013). At the same time, other people have been deeply convinced by GAP discourse or have actual hopes to benefit from the Ilısu Dam and the GAP program in general, through job creation and education opportunities (Harris, 2012). The web of power, territorial reality construction, and resistance is complex and ambivalent. This overlaps with Harris' call to "move beyond simplistic associations of the southeast as 'Kurdish' or necessarily oppositional to the Turkish state" (Harris, 2009: 14).

As the Ilısu Dam neared completion, discussions or protests nevertheless continued: different protest actions such as bicycle rallies or gatherings in Hasankeyf were organized in 2014 and 2015, and some political parties associated with the Kurdish people made the dam a campaign issue during the presidential elections in 2014. A court rule in July 2014 states that the Ilısu Dam cannot be exempted from the mandatory environmental impact assessment, reversing the Turkish government's earlier change of laws (Hürriyet Daily News, 2014a). Furthermore, the PKK has called upon construction workers to resign, attacked machinery needed for dam construction and abducted two subcontractors (Dargecit Haber, 2014; Hürriyet Daily News, 2014b). These developments, between August and December 2014, halted constructions that were only resumed when workers from mainly non-Kurdish provinces were brought to work at the site under tight security measures, involving over 1000 soldiers and recruiting Kurdish village militia (Ayboğa, 2015).

The dam construction was finally finished in 2018 and, together with the hydroelectric power plant, officially inaugurated by president Erdoğan in November 2021 with grand words (Figure 9 and Figure 10): "This work is the best answer to sworn enemies of Turkey and those who are hostile to their own country and the nation" (Beyaz, 2021) and "We have to use our full potential in order to protect our country against food crisis, triggered by drought, and similarly against the increasingly more visible energy crisis. We cannot tolerate wasting even a drop of our country's water resources. […] The Ilısu project […] symbolizes peace, brotherhood, serenity, prosperity and power" (Presidency Of The Republic Of Turkey, 2021).

[13] Interview representative Doğa Derneği, 11.05.2013

Figure 9 Inauguration of the Ilısu Dam by President Erdoğan in November 2021 at the foot of the reservoir (Presidency Of The Republic Of Turkey, 2021)

Figure 10 The finished Ilısu Dam (Daily Sabah, 2020)

Whereas the Turkish government draws a bloomy picture of a magnificent project, a new tourist attraction and happy inhabitants (Batman Governorship, 2021; Presidency Of The Republic Of Turkey, 2021), the actual on-the-ground effects are contested. Historic Hasankeyf has been flooded (Figure 11); the state-planned resettlement town New Hasankeyf is a rather faceless retort city made out of standardized cement cubes (Figure 8). Furthermore, there have been complaints about poor water quality and interrupted drinking water supply in the town (Hasankeyf Matters, 2021b), reports about the absence of tourists and thus tourism-derived income (France 24, 2020), accounts of lacking possibilities for agricultural and other economic activities (Evrensel Daily, 2021), and, in general, stories of agony because of forced resettlement and submergence of houses, graves and archaeological sites (France 24, 2020; Taylor, 2019). Dramatically, because of lack of rainfall and dropping reservoir water levels, some of the houses and sites temporarily reappeared heavily damaged a few months after having been submerged (Hasankeyf Matters, 2021a).

Thus, just as the pre-construction hydro-territorial imaginaries were strongly contested and differed according to actors' political position and interests, so are the post-construction lived experiences and imaginaries about the emerging hydro-

Figure 11 Submerged Hasankeyf in 2021 (Kilic in Taylor, 2021)

territorial relations. However, the socio-political, economic, cultural, environmental and hydrological impacts associated with the Ilısu Dam have just begun to unfold. It will therefore remain crucial to investigate how the dam will continue to re-configure adjacent hydrosocial territories and oppose, entwine with and/or change people's livelihoods and imaginaries about themselves and their socio-economic, cultural, political and ecological environment.

3.5 Conclusions

Local and translocal contestations, negotiation processes and struggles to stop dam building, in a context of tremendous political, economic and cultural sensitivities, have made the Ilısu Dam project a very insightful case of a hydrosocial territory and its various contested imaginaries. Stakeholders construct different socionatural imaginaries and build multi-actor and multi-scale coalitions to justify or de-justify the Ilısu Dam according to their backgrounds and interests. Coalitions and their mobilized imaginaries evolve and change over time, showing how highly dynamic these hydrosocial territories' imaginaries often are. This chapter has analysed arguments of the Turkish government, and its alleged underlying interests, as contrasted and contradicted by the wide array of dam opponents. I discussed how such a massive infrastructure project has different effects for different people and ecologies, generating winners and losers with outcomes that are not yet clear. Therefore, impact analysis cannot be based on overall categorizations and generalizations but must scrutinize on-the-ground effects, considering highly divergent cultural, political, technological and ecological issues, and differentiate among a wide variety of nearby and distant places, peoples and livelihoods.

The analytical focus combining hydrosocial territoriality and governmentality has shown how mega-hydraulic development projects make or imagine territorial re-configuration: hydrologically, physically, economically, socio-culturally and discursively, all at once and in entwined ways. This chapter and the case study have showcased dam construction's multi-dimensionality, including governmentality projects going far beyond 'just' water governance. Allegedly 'neutral', 'technical' infrastructure projects entail discourses implying concealed efforts to reconfigure existing socionatural relationships and implant new meanings, values, distribution patterns and frames of rule-making and alignment; they aim to build profoundly new 'territory' matching powerful ruling group interests (in people and resources) to self-governing citizens.

The engagement with the concept of hydrosocial territories shows how it presents a theoretical innovation that stresses the potential diversity of overlapping, simultaneously existing hydro-territorial imaginaries in one and the same geo-political location that result from multi-scalar political geography shaped by water flows, technologies, institutions and power structures. Further, by incorporating the governmentality focus, the subtleties of the web of domination-resistance get important attention, whereby Foucault's governmentality studies are reconsidered in terms of socionatural networks rather than as a sole matter of biopolitics. "Government is the right disposition of things ...", as Foucault himself states, "... what government has to do with is not territory but rather a sort of complex composed of men and things. […] Men in their relations, their links, […] the territory with its specific qualities, […] ways of acting and thinking, etc." (Foucault, 1991: 93). In this Foucauldian conceptualization power is omni-present (which is not the same as omnipotent, or hegemonic as in Gramscian conceptualization). In that sense, this chapter demonstrated how power is not 'in' or 'possessed by' particular human groups, nor is it fixed in the technology. Power acts as a mediating force and is reshaped and redistributed through inter-human and human-nature-technology interaction. Accordingly, power and resistance are produced in action at every moment and not restricted to particular nodes or locations.

Finally, although dam opponents did not attain their goal, involving multiple organizations in the struggle stimulated debate about the dam and questioned dominant Turkish government discourses. Their actions have helped to attract national and international attention to injustices happening in the southeastern provinces – more of which will be needed. The dominant imaginary has now been deeply contested and cannot simply materialize in hegemonic territory as foreseen. The near future will track these hydrosocial collisions and struggles, in on-the-ground, plural, always-contested territories.

Who controls the past controls the future. Who controls the present controls the past.

George Orwell in the book *1984* (1949)

From natural flow to ‘working river’: Hydropower development, modernity and socio-territorial transformations in Lima

4.1 Introduction: Geographical modernity[14]

Aspirations of modernity have long steered the transformation of landscapes, technological development, industrialization and people's desire to become masters of the environment and their own destiny (Bauman, 2007; Mumford, 1967; Weber, 1981 [1927]). Importantly, modernity has often been a profoundly political-geographical project that set out to transform nature and people in the name of progress, development and in general terms betterment (Kaika, 2005; Smith, 1984; Swyngedouw, 1999). Two key materializations of modern ideas have deeply shaped the history of Lima, Peru's capital, and its adjacent watersheds since the nineteenth century: accelerated urban development – the playing field for realizing modern living – and electricity – an integral part of this modern way of life and progress. Aspirations of modernity, urbanization and electrification led to the successive construction of small hydropower plants and associated hydraulic infrastructure in the Rímac watershed, reconfiguring hydrosocial rural-urban relations in profound ways.

By combining scholarship on modernity, hydrosocial territories and rural-urban relations, this chapter analyses how urban-based modern values, visions and ambitions have been materialized in hydraulic technologies and water access and control arrangements that shape hydrosocial relations in the watershed up to today. It shows that the conquest of disobedient and savage water flows by engineers' visions and technical skills was central and deeply enmeshed with political agendas and ideas of civilizing and modernizing nature and people. In particular, discourses that sustained and promoted hydropower plant construction and associated development projects in the Rímac watershed are analysed to show how engineers and companies have inscribed their ideas of progress and modernity in hydraulic and territorial designs. The analysis scrutinizes how historical physical-ecological, legal, social and symbolic reconfigurations continue to shape hydrosocial relations between the growing city of Lima and the Rímac watershed. In the face of urban growth and climate change, the Rímac watershed's history is increasingly becoming a subject of interest again due to intensifying competition for water resources. Regional history has become a matter of negotiation and subject to political debate, as the diverse actors currently present in the watershed remember it differently and according to their own particular interests and positions. This demonstrates how the hydrosocial territories, in which rural and urban actors in the Lima region are entangled, continue to be renegotiated.

[14] A previous version of this chapter was published as L. Hommes and R. Boelens (2018) From natural flow to 'working river': hydropower development, modernity and socio-territorial transformations in Lima's Rímac watershed, *Journal of Historical Geography* 62: 85-95.

4.2 Modernity, hydraulic technology and rural-urban territories

As of 2017 (the time the research for this chapter was concluded), there are seven hydropower plants (HPPs) in the Rímac watershed with two more planned (see Figure 2 in Chapter 1). Five of the seven HPPs were constructed between 1938 and 1965, and are currently owned by Italian multinational Enel. The two newer HPPs were constructed by mining companies to produce electricity for their operations throughout Peru. Besides the presence of many hydropower plants in a rather small area, the Rímac watershed figures prominently in debates about water supply for the megacity of Lima, as the majority of the city's ten million inhabitants receive their drinking water from this watershed and the trans-Andean water transfers from the Mantaro watershed. As this chapter shows, the intense and diverse usage of the Rímac watershed is the outcome of historical socio-territorial imaginaries, engineering projects and negotiations over water access and decision making.

To understand the ways in which the Rímac watershed and its relation to Lima have been reconfigured since the arrival of the hydropower companies, I draw on scholarship about modernity, urbanization and territory. Whereas the conceptual framework of this dissertation puts imaginaries in general central, this chapter focuses specifically on *modern* imaginaries. I scrutinize how they were materialized in hydraulic technologies and how these, in turn, affected the physical-ecological, economic, legal and socio-cultural dynamics in the Rímac watershed. This chapter thereby shows the centrality of modern imaginaries in large-scale water infrastructure development. With regards to ongoing scholarly debates, I demonstrate that discussions about modernity and hydrosocial territories can complement each other, and help to understand hydropower and urban development's multi-scalar and multi-dimensional transformation dynamics.

The West's iconic referent for modernity is Prometheus, the mythical hero who stole fire from Mount Olympus to bring light and hope to humanity, who would then be empowered to shape progress and development themselves. Ever since, social, technological and ecological utopias have envisioned liberation from the dark ages and dependence on the whims of gods and nature. Francis Bacon's New Atlantis forecasts people's radical split from traditional subsistence economies thanks to natural science, nature's utter domestication and technological development that would guarantee societal perfection (Bacon, 1999 [1626]). In a similar manner, James Scott characterizes more recent 'high modernism' as a local-global project built on

"supreme self-confidence about continued linear progress, the development of scientific and technical knowledge, the expansion of production, the rational design of social order, the growing satisfaction of human needs, and, not least, an increasing control over nature" (Scott, 1998: 89). Other characteristic features of modernity are instrumental rationalities and the deep belief in the calculability of societal choices and preferences, as well as the intent to make cultural meanings, values, language and knowledges commensurate in order to arrive at one common metric (Bauman, 2007; Haraway, 1991; Lemaire, 2010). In consequence, reflecting foundational modernist notions as expressed by liberal-utilitarian thinker Jeremy Bentham, ideas and projects are often promoted as modern in the name of the common good and maximizing utility (Bentham, 1781, 1787).

Even though modernity is not an unambiguous concept, as it is shaped by the particular ideas and identities of those that push modernization at specific moments, the belief in the ability and necessity to plan the socionatural future is always central (Eisenstadt, 2000). This belief, emphasizing agency and humanity's ability to actively shape the physical environment and society as wished, is intrinsically based on an epistemological and ontological divide between society and nature (Latour, 1993). Nature is viewed as the other, nonhuman, disordered and savage, an entity that needs to be colonized, civilized and subjected to humanity's will (Bauman, 1991; Foucault, 1975; Oliver, 2000).

One particularly important modernizing project that requires nature to be transformed and put at the service of humanity is urban development. Created by industrial society and distant from what is considered rural, traditional and backward, cities have been portrayed as exclusive arenas of modernity (Echeverria, 2008). The transformation of nature is both necessity and an aspiration to turn cities into civilized, modern spaces with sufficient and convenient supplies of water, food and energy (Banister & Widdifield, 2014; Mumford, 1967). In this quest for resources a city's reach extends far beyond the traditionally considered city boundaries, changing rural-urban relations through the transformation of space and the rules governing it (Cronon, 1991; Heynen et al., 2006; Kaika, 2006). In the case of Lima it was first electricity and later the provision of drinking water that was regarded as crucial for urban modernity. The resulting hydraulic projects changed not only river flows but were intrinsically connected to dreams of modernizing the rural watershed and its inhabitants.

Therefore, urban modernization needs to be understood as a profoundly territorial project. It is territorial because it involves processes in which cities newly delineate their areas of influence, creating hierarchical, space-based relationships with rural areas, regulating actions and the use of space and, in particular, resources such as land and water (Baletti, 2012). In a general sense, Erik Swyngedouw and Rutgerd Boelens argue that "territory is the socio-materially constituted and geographically delineated organization and expression of and for the exercise of political power" (Swyngedouw & Boelens, 2018: 117). Territories are thus not necessarily only associated with nation state boundaries, but rather understood as more broadly defined bounded political spaces: bounded in the sense of geographically demarcated and political in terms of socio-spatial authority and hierarchical power relations (Antonsich, 2011; Swyngedouw & Boelens, 2018). They are composed of social, symbolic and physical constituents: relations and actions, legal and political arrangements, discourses, physical artefacts and ecological systems (Boelens et al., 2016) These constituents blend together and mutually (re)produce each other at a given time and space. For example, social relations, discourses and practices produce material changes in nature and ecological relations at specific moments, and are in turn shaped by these ecologies.

Territories, therefore, are dynamic and historically constituted (Brighenti, 2010). They evolve out of social encounters and are the effect of social relations' material inscriptions, which define what spaces look like and how social relations are organized (Agnew, 1994). The making of territory is an interactive and continuous process that emerges from imaginaries of what a territory and its judicial, political, economic, social, cultural, affective and physical aspects should look like. Values and aspirations – such as those connected to modernity – are projected onto a space and its people and institutions. Boundaries are redrawn. To realize, maintain or contest socio-territorial projects, different actors mobilize the resources available to them (Bebbington et al., 2010; Escobar, 2008). The resulting struggles can be open or subtle, finding expression in, for example, hidden everyday struggles, disputes about discourses or recognition of knowledge, or 'mimicry strategies' which feign acceptance of dominant arrangements to protect local territorial governance (Boelens, 2015; Scott, 2010).

Efforts to modernize always change nature, space and social organization, but they are not always a territorial undertaking with ordering practices that delineate space under a specific authority. In the case of efforts related to urbanization, however, modern projects for urban water and energy supply redraw city boundaries and entwine urban and rural spaces, communities and waters. Rural-urban social, symbolic and physical relations become redefined; urban modernity operates as a territorial project.

In the modernist transformation of natural resources and rural territories, knowledge and technical capacity to conquer nature are central, and engineers take on a specific role (see for example Bijker, 2007; Molle et al., 2009; Oliver, 2000). Beyond merely technical agents, they are often key promoters of modern projects who inscribe their ideas of progress, development and modernity in hydraulic designs and political-geographical interventions (Callon, 1990; Sanchis-Ibor et al., 2017; Teisch, 2011). Some designers and engineers may not consciously envisage the socio-political and cultural effects of hydraulic technology beforehand, whereas other design choices deliberately aim to change a region's socio-political and cultural makeup by altering water flows (Carey et al., 2012; Hommes et al., 2016). Jessica Teisch, citing the North American engineer Frederick Newell, states that "many engineers … viewed themselves as 'missionaries of light and progress', pioneers of a 'better and higher degree of civilization'" (Newell cited in Teisch, 2011: 9). Modernized, technologically reconfigured landscapes may thus be considered as 'humanised nature' that contains history, cultural meanings and power relations (Pfaffenberger, 1988). Accordingly, hydraulic technology is inherently social and material, and reconfigures territories in their whole hydrosocial complexity. Given the importance of the role engineers assume in modern hydraulic projects, part of this chapter's analysis focuses on such engineers, their discourses and aspirations, showing how they have been central agents in reconfiguring rural-urban hydrosocial territories.

In the case of Lima's urban development and its relation to the surrounding watersheds, state institutions have so far focused on studying the hydrology of the watersheds. There is little research on historical reconfigurations triggered by ideologies and demands for water and energy. This is surprising considering the importance of Lima and the urgency of understanding and addressing the capital's water issues. Likewise, at national level, critical literature on river basin engineering in Peru is limited. As an exception, Barbara Lynch shows how water scarcity discourses in Peru are produced and how they facilitate water transfers from highland areas to agroexport production on the desert coast, resulting in water use conflicts (Hoogesteger & Verzijl, 2015; Lynch, 2013). The particular aim of this chapter, however, is an in-depth analysis of the role modern ideologies played in the justification, design and execution of hydraulic projects that substantially changed rural-urban relations and water flows in Lima. The contribution is thus conceptual as well as empirical.

4.3 Transforming the 'river that talks' into the 'river that works'

The history of the impact of urban development on the Rímac watershed can be divided into three phases: the first (1890-1925) being the initial interventions of downstream water users in upstream areas; the second (1925-1970) marked by the intensified construction of hydropower plants in the watershed driven by development visions; the third (1970 to today) shaped by Lima's growing need for drinking water resources. The emphasis of the historical analysis is on the second period, where urban demands for energy and modernity transformed the Rímac from the 'river that talks' (the original Quechua meaning of the name) into 'the hardest working river in the world' (Buse, 1965), radically changing hydrosocial relations. Understanding the historical geography of these dynamics helps to uncover the enduring impact they have on present day rural-urban relations, as will be discussed in the second part of the chapter.

Institutionalization of control over highland lakes, 1890-1925

As agricultural production of cotton, sugarcane and avocado on plantations in the middle and downstream valleys of the Rímac watershed intensified in the course of the late nineteenth century, so did the interests in upstream water resources. These resources were imagined to be bountiful and freely available for downstream agricultural development, which, in 1904, led downstream landowners to start exploring upstream water resources through a state led study of highland lakes' storage capacity (President of the Central Union of the Rímac Valley, 1904). This study resulted in the state financed construction of several dams in the highland lakes to seize rainwater for downstream agriculture. The fact that both the study and the dam projects were financed by the state, shows the strong association of state institutions with downstream water requests.

Though community responses are scarcely documented, archival documentation reveals that in 1921 the community of San Lorenzo de Huachupampa complained to the Ministry of Development and opposed plans to construct a reservoir, arguing that it would deprive them of their agricultural livelihoods: "It is these territories, irrigated with our very own labour, that are now destined to be expropriated for the benefit of the powerful landowners of the Rímac Valley […] no monetary compensation will help us as we will be left with nothing to work on […] leaving us with no choice but to abandon our village altogether". In response, a state engineer claimed a different

reality, trying to convince the minister that "one has to acknowledge the truth of the facts […] that they have to leave the village seems exaggerated, only a very small part of their territory will be flooded" (Valdez, 1921). Despite the fact that the project in question was never realized, Huachupampa's complaint shows how the watershed was not simply an empty, unused space for hydraulic dreaming and planning. Rather, territorial control has been and remains contentious.

A few years after the first highland lakes were dammed, the presence of the *Empresas Electricas Asociadas* (Associated Electric Companies, hereafter referred to as the Electric Companies) in the watershed became more evident every year. Founded in 1904 as a merger of smaller electricity companies, the Electric Companies became a central player. From the beginning on they had important political and financial connections nationally and abroad, for example through the first general manager Mariano Prado Ugarteche, member of the powerful Prado dynasty and son and brother of presidents Mariano Prado and Manuel Prado y Ugarteche (Repetto & Hidalgo, 2012).

In 1914 the company signed a contract with the municipality of Lima to provide the city's public lighting, which subsequently created the need to secure further water resources for increasing hydropower production.[15] The company thus joined forces with the owners of Rímac valley estates, state officials and downstream industries and, in 1920, founded the Huarochirí Lagoons Oversight Board (*Junta de Vigilancia de Las Lagunas de Huarochirí*) to dam and administer highland lakes (Bianchini, 1933). Upstream rural communities were not on the board, though the highland lakes were in their community constituencies. Only downstream water users with political and economic power were members.

In the following years, several more highland lakes were dammed with financing from the Electric Companies and backed by official state authorization (Empresas Eléctricas Asociadas, 1934a). The step-by-step acquisition of control over upstream water resources makes clear how slowly but continuously water flows, water control arrangements and the position of different water user groups changed. Even though, in most cases, communities were still able to use water from the newly built reservoirs, the authority and terms of this water use changed and became dependent on the approval of downstream actors. Political relations, state support for valley land

[15] At this time the company was in possession of two hydropower plants and one thermal power plant (HPP Chosica, 1903; HPP Yanacota, 1907; Thermal power plant Santa Rosa, 1985).

owners and the hydropower company and exclusion of rural communities became institutionalized in the oversight board, which then drove the materialization of these relations in retaining walls, gates and reservoirs, that in turn profoundly reconfigured the hydrosocial territories of the Rímac watershed. In other words, through the interplay among socio-cultural, legal-institutional, economic and physical arrangements, new space-defining patterns, water flows and relations were established that set the conditions for future hydropower plant construction.

Hydropower development and water transfers: dreams of civilization and the domination of nature, 1925-1970

Territorial changes in the Rímac watershed accelerated when engineer Pablo Boner arrived in 1925. Born in 1889 in Switzerland but widely travelled, he is said to have fallen in love with the Andean mountains and their possibilities for hydropower development (Neue Zürcher Zeitung, 1964). Taking long hikes to the Huarochirí Lakes to determine their capacities, he became known as the 'Water Hunter' (*el Buscador del Agua*), and is still famous by that name in Andean communities today (Figure 12 and Figure 13) (Buse, 1965). His expeditions resulted in an ambitious plan for further damming of the Huarochirí Lakes, constructing six hydropower plants and an inter-basin water transfer from the Rímac to the Santa Eulalia sub watershed. Approved in 1933, the plan was later complemented by a trans-Andean water transfer (known as Marca I) that diverts water from the Amazonian Mantaro river to the Santa Eulalia watershed.

Figure 12 Pablo Boner in the Huarochirí mountain range (Cámara de Comercio Suiza en el Perú, 1991: 256)

Figure 13 Pablo Boner, the water hunter, during an expedition to the Huarochirí Lakes (Private Archive A. Boner, Lima, Peru)

As a result of Boner's projects hydropower plants came to characterize the landscape and control the watershed's water resources, conducting water from one plant to the next through underground tunnels (Figure 2), leaving little in the natural riverbed especially in the dry season. From then onwards river flows were no longer nature's doing but came to be regulated by engineering decisions and business considerations made in Lima. The city's spatial reach – in its material-geographical as well as socio-political sense – extended, incorporating the rural areas of the Rímac watershed into Lima's hydrosocial territory. This, however, does not imply that rural communities were left without water. In some cases communities benefited from trans-Andean water transfers through the so-called 'water vents' (*ventanas*) from the tunnels. Yolanda Ramirez has also documented how compensation payments brought certain benefits to communities (Ramirez Villacorta, 1980).

Besides legal and state support, hydropower development was profoundly sustained by modernist discourses, values and socio-territorial imaginaries, particularly about civilization and the domination of nature (Banister & Widdifield, 2014; Kaika, 2006). Hydropower development around Lima was promoted as a prerequisite for development and progress. As the Electric Companies remarked on their sixtieth anniversary: "the progress of people is conditioned by several basic factors, among them the electric industry […] The great progress of Metropolitan Lima has had and will continue to have the Electric Companies as a loyal and efficient ally" (Empresas Eléctricas Asociadas, 1934b: 96). In a similar manner, a co-financier of the HPPs called electricity "the lifeblood of any modern industrial city" (Boveri, 1960) and national engineering hero Santiago Antúnez de Mayolo declared that "Lima, the Pearl of the Pacific, needs to shine at night with potent bundles of light that extend over her and neighbouring populations" (Antúnez de Mayolo, 1929).

The best and possibly only way to electricity and progress was seen to be engineering genius and the domination of nature. Peru's geography was regarded as both a blessing and a curse: a blessing because of the great potential for hydropower that the Rímac watershed's topography offers; a curse because the water resources to fully realize that potential were mainly located in the Amazonian Mantaro basin. Natural conditions were accordingly seen as a 'natural injustice' that needed to be overcome in order for humanity to progress towards modernity (Buse, 1959a). The powerful conviction that the Andean highlands' water flow regimes could be neatly planned, that water's diverse meanings, values, uses and rights could and should be calculated and designed, that water flows would follow the logic of capital flows, and that water

governance necessarily must be guided by an instrumental rationality of maximizing utility, were key to the Rímac's modernization project: "Today the Santa Eulalia River has been conquered, until the last drop of its potential energy is squeezed […] Without Boner's dreams none of these industrial projects would be a reality, nor would Lima be the best illuminated city in South America" (La Prensa, 1959).

This transformation of nature had to be achieved through technical genius. Different portrayals of the massive hydraulic undertakings of Boner and the Electric Companies show how they were not simple outcomes of unemotional technical evaluation, but rather materializations of the modernist dream of engineering as a liberating and civilizing mission:

> "Technical design means liberating men from their struggle for existence and giving them a better opportunity to develop their personality and soul, to become a higher class of human being, more intelligent and technically better equipped to live peacefully in the future." (Boveri, 1960)

> "Men's labour has dominated the landscape and regulated raging torrents. Works of civilization in its most exact sense: dominance and utilization, true conquest for the community's benefit […] Great victory for men, their science and determination!" (Buse, 1959a: 3)

Technical hydraulic designs liberate through the domination of landscapes, water and ultimately also Andean highland villagers, who were portrayed as backward. The authority and ability to dominate were granted to engineers, and their hydraulic works were described as "awe inspiring altars devoted to the progress of the Peruvian nation" (Bianchini, 1965). Attributing symbolical pre-eminence to engineers and their works automatically renders any resistance to projects illegitimate interference with progress and the national good. A powerful imaginary thus directs people towards choosing progress over backwardness; affected communities are described as needing civilization, which justifies interventions (cf. Boelens & Post-Uiterweer, 2013). Hydropower development then becomes a civilizing mission turning savage and supposedly unused waters into workers for progress and saving rural people from the dark. The brochure for the Electric Companies' 1967 anniversary illustrates this vision, stating that "the hydroelectric works have paved the way to progress for local communities" (Empresas Eléctricas Asociadas, 1967). The same brochure contrasts a power line, symbolizing progress, with a llama, symbolizing local livelihoods and

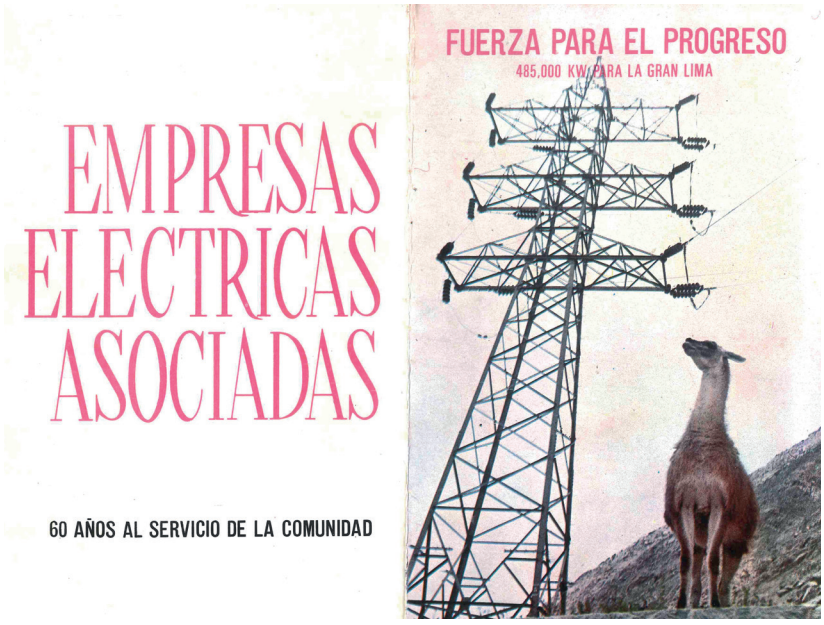


Figure 14 Brochure of the Electric Companies: "60 years serving the community" and "Power for progress – 485,000 KW for the Great Lima", 1967 (Private Archive A. Boner, Lima, Peru)

backwardness (Figure 14). This illustrates how the definition of what is modern is always relational. It is defined through contrasting the modern (electricity and urban development) with presumably obsolete, traditional rural lifestyles. Besides this discursive and physical differentiation between urban and rural, the dams, hydropower plants, access roads and redirected water flows also create important irreversible links between the two. Urban and rural actors, imaginaries, practices and materialities become enmeshed in a shared, complex and ambiguous hydrosocial territory.

Besides installing light and building roads in communities, the Electric Companies also started a project with Swiss cooperation to support local development by introducing Swiss cattle breeds and cheese making to local communities, "enabling the indigenous people to improve their material position, within the limitations of their education" (Swiss Embassy in Peru, 1961: 1; see also Sanders, 2015). While some see this as an early form of corporate social responsibility, it can also be seen as a vision in which not only nature but also people needed to be civilized and brought closer to the modernity of urban and foreign elites (Hidalgo, 2011). Beyond that, a letter from the former Swiss ambassador demonstrates that the modern mission materialized through hydropower and development cooperation was essential to curtail communist currents:

"Job opportunities for the people of the Sierra should be created […] in areas near cities, where communist propaganda can easily penetrate. Apart from agrarian reform and mining, no major projects can be carried out for the time being, as the population is not ready for this" (Swiss Embassy in Peru, 1961: 1). This suggests that the Electric Companies' hydraulic mission involving Swiss engineers was deeply enmeshed in political agendas and ideas of modernizing nature and people.

Local communities still internalize and reproduce the narrative depicting the Electric Companies as saviours and light bearers: "Thank God the company came" and "thanks to the hydropower plant we had light when other communities were still in the dark". Especially in communities that receive water from hydropower plant tunnels, Pablo Boner enjoys legendary status: "He always came to our community and participated in our communal work days, dancing and drinking side by side with us. He was like us".[16] Similarly, it is said that he modestly insisted that it was the mountains and not him who made the Rímac hydropower marvel possible.[17] This suggests that, for Boner himself, his work was strongly motivated by a fascination with the existing possibilities for hydropower and the drive for progress.

The period of intensive interventions in the Rímac watershed thus resulted in the construction of water transfers and highland dams. The hydropower company acquired a privileged position for accessing and controlling water, assigning rural communities a subordinate position. Framing hydropower development as bringing progress and modernity, providing light and dominating nature, further supported such hierarchical thinking and arrangements. Rímac watershed history also shows how urban and rural histories have become increasingly entwined during the last century. Through the construction of the hydraulic infrastructure and the resulting redirection of water flows, the material as well as political-administrative reach of the city, its interests and electricity demands redefined the rules that governed the watershed territory.

Growing urban water demands and expanding supply networks for Lima, 1970s to today

After the inauguration of the trans-Andean water transfer and the Matucana hydropower plant in 1972, the Electric Companies were nationalized and renamed Elektrolima during Juan Velasco's military rule. It stayed a public company until 1994,

[16] Interviews community members Santa Eulalia watershed, 21.06.2015 and 20.03.2016
[17] Interview A. Boner, 26.04.2016

when it was privatized during the neoliberal government of Alberto Fujimori. From 1994 to 2016 the company was known as EDEGEL.

In the late 1970s, urban water demands started to increase and, as a response, Lima's Drinking Water Company SEDAPAL began to look for additional water resources in the adjacent watersheds. As Elektrolima had an interest in maintaining electricity production levels in the existing hydropower plants, several joint water supply projects were implemented with differing financial and operational arrangements: the Yuracmayo reservoir in 1994, the Marca III project in 1999 and Marca IV in 2012.

In this period, the role of the watershed changed from being a source of energy to a source of drinking water for the growing city. The provision of drinking water – and no longer the provision of energy – came to be seen as essential for turning Lima into a modern city.[18] Another particularity of this period was that the emergence of SEDAPAL as a new powerful actor in the Rímac led to an alliance of convenience with Elektrolima.[19] This alliance united financial, political and discursive powers to finance costly mega projects, to ensure sufficient political support, to obtain legal permissions, and to promote multi-purpose projects legitimized by referring to the human right to water and electricity required for development. In particular, the moral and legal prioritization of drinking water provision shields both actors and their joint water supply projects from potential contestations, and secures desired water flows. For the hydropower company this has been an important safeguard given the decreased dependency of Lima on electricity produced in the Rímac watershed.[20] The drinking water-hydropower alliance has strengthened the presence and control of urban actors in the watershed, reinforcing established use hierarchies.

In the next section, two case studies demonstrate the diversity of impacts that the Rímac's socio-territorial history continues to have: first, the current management of the Huarochirí Lakes and, second, the water vents from the hydropower company's tunnels, which provide irrigation water for communities. These cases show that the history of the Rímac watershed is not a black-and-white story of water deprivation but rather one of complex, entangled, multi-dimensional relations. It also shows how changing beliefs

[18] Many scholars have analysed how securing drinking water for urban development is regarded as decisive for achieving urban modernity, see for example Banister & Widdifield (2014), Illich (1985), Kooy & Bakker (2008), Swyngedouw (1997).
[19] Interview representative SEDAPAL, 17.08.2015
[20] Interview former employee EDEGEL, 23.03.2016

and diverging recognitions of the watershed's history result in continuous renegotiation of socio-territorial arrangements.

4.4 Relations of dependence in the Rímac watershed today

The Huarochirí Lakes are an important part of the Rímac watershed. In 2017, fifteen of the largest lakes were being used and managed by the main hydropower company Enel, giving them key decision-making power over water resources. Though the lakes' importance for hydropower generation has diminished in terms of quantity since the trans-Andean water transfer was inaugurated, they still provide significant emergency reserves. If the transfer tunnel collapses hydropower plants and Lima would rely strongly on them. At the same time, the reservoirs and highland lakes provide essential irrigation water to communities.

As the historical analysis has shown, the lakes' ownership and management changed significantly over time. Yet, several historical events and developments have become obscured, forgotten or reinterpreted. Most strikingly, peasants in communities today say that the hydropower companies alone dammed the lakes, rather than an alliance of different downstream users. This lends legitimacy and recognition to the current situation, seeing the builder as the rightful owner and manager. This notion of 'hydraulic property creation', whereby water rights and property relationships become inscribed in hydraulic artefacts and organize their use and control, is deeply ingrained in Andean communities (Boelens & Vos, 2014). So, consensus about 'who' is largely clear (though inaccurate), but details about water use agreements, payments to communities or expropriations are ambiguous. As one farmer explained, the hydropower company "asked the community for permission to build the dams, and our forefathers agreed, but we don't know if they really paid something for it, which they should have". In this narrative, current peasants dissociate themselves from their forefathers, portraying them as uneducated and destitute: "Our forefathers could not negotiate good agreements because they didn't have education or know their rights. The companies, by contrast, came well prepared".[21] The company currently managing the reservoirs is also not explicit about how they were acquired, and their official water use permits state the amount of water intake of each plant without specifying original water sources and use rights for the Huarochirí Lakes (for a water use license see Ministry of Agriculture, 1995).

[21] Interview community member Santa Eulalia watershed, 17.03.2016

This suggests that the legal situation of reservoir appropriation, ownership and management is blurred, while rules of practice clearly put the hydropower company in control. This is a major advantage for the company as it condones agreements that were negotiated under possibly unequal power relationships. Concessions are generally portrayed as a taken for granted historical fact. Yet, the broad acceptance of the company's management exists side by side with narratives about local ownership of lakes and water ('our territories, our lakes, our water'), exemplified by statements such as "they are using our water and making profit out of it".[22] Interestingly, these narratives also include a profound scepticism towards the Peruvian state, which is believed to be complicit in the appropriation of water resources: "The companies now own the water because the state owns it, so we cannot say it is ours anymore"; "Nowadays state authorities and companies manage and administer the water and they are going to allow only efficient uses in the future. They are going to measure each water user's productivity and decide who to give water to, leaving us without sufficient water".[23] The state and state law are thus not regarded as protective but rather as potential threats to communities' water interests, which is also due to Peru's neoliberal natural resource governance policies that facilitate the transfer of community water resources to extractive industries, increasingly excluding communities from water control. The potential weakening of community interests vis-a-vis urban interests in the Rímac watershed is further enforced as the water used for hydropower is also the drinking water for Lima, which has priority under national law and international guidelines. The consolidation of water uses is a strategic, modernist cultural-political conflation of meanings and usage rights, guaranteeing water supply for hydropower companies (Duarte-Abadía & Boelens, 2016; Espeland & Stevens, 1998). As a former hydropower company engineer stated, when communities try to reclaim water rights "the company can wash its hands, claiming the water is not theirs but SEDAPAL's".[24] The local water authority's discourse tends to simply stress the fact that the correct legal procedures were followed when damming and tapping lakes. Community complaints are devalued in advance, suggesting that complaining is just a characteristic trait of peasant communities: "The companies received authorization to build dams and use the water in their power plants. However, now most certainly communities will start saying 'these are our lakes, this is our water'".[25] Thus, according to their interests and

[22] Interview community member Santa Eulalia watershed, 07.08.2015
[23] Interviews community members Santa Eulalia watershed, 17. And 18.03.2016
[24] Interview former employee EDEGEL, 23.03.2016
[25] Interview local water authority, 04.04.2016

positions, actors remember or imagine differently how control of the Huarochirí Lakes was established, whether it is legitimate and how it could potentially be maintained or altered in the future. Water use and control are thus constantly renegotiated and re-remembered. History takes a central role in these renegotiations, both in terms of questioning current arrangements as well as sustaining them (cf. Perreault, 2018).

Though certain amounts of water can still be diverted to agriculture in most cases, property structures and management arrangements increasingly raise concerns. Communities feel dependent on the company's goodwill, limiting their autonomy to manage water resources. One example is that a mayor's request to use reservoirs for fish farming was denied; another is that the Association of Huarochirí Communities has to negotiate with the hydropower company about which water resources to use for a locally-managed intra basin water transfer (Ríos López, 2014). Concerns about this dependency were already expressed in 1941 by the president of the upstream community of Huanza: "we have possessed water use rights for lake [Carao] since immemorial times [and] request the Ministry of Public Works to officially provide us with exclusive rights to use this water for irrigation, informing the Ministry that these are the only waters left for the people of Huanza after all other water sources have been claimed by the Electric Companies for hydropower generation" (Rojas, 1941).

Besides highland streams, lakes, reservoirs and springs, some communities use water that comes from vents in the tunnels conducting water from one HPP to the next. As with the reservoirs, the history of water vents is ambiguous and today's relationships are characterized by dependence. Communities state that water vents were constructed as in kind compensation for the negative effects of hydropower companies' construction works, while also contradictorily portraying them as charity: "Thank God the company came and gave us the vents and water".[26] The companies and engineer Pablo Boner are remembered as saviours who brought water and light, as exemplified by a memorial plaque at one water vent with the inscription "San Lorenzo de Huachupampa peasant community – in gratitude to the Electric Companies for the water from vents 3, 4 and 5 (27 December 1964)" (Figure 15).

[26] Interview community member Santa Eulalia watershed, 20.03.2016

Figure 15 Memorial plaque at water vent in San Lorenzo de Huachupampa (picture taken by author, 2015)

However, the company in charge of the tunnel has different ideas about the water vents. Some representatives agree that they were established to compensate communities for construction- related damages; others say vents were simply needed to remove materials from the tunnel during construction.[27]

Until recently, historical facts did not seem particularly important as communities could use water without severely affecting energy production. Campaigns to formalize water rights, concerns about climate change and growing urban water demands are changing this. In a water shortage, it is technically possible to close the vents at any time. This happened some years ago, when acute water shortage was used as justification to close one vent and never open it again (Bleeker, 2016). Similarly, the mayor of a community that depends completely on water from the tunnel is campaigning to construct water reservoirs to decrease the community's dependence, saying that "the engineers told us that maybe in twenty or thirty years they are going to ration the water flow because the water is for Lima, and Lima continues to grow, so they will need all the water. Also, the climate is changing".[28]

[27] Interview A. Boner, 26.04.2016
[28] Interview local mayor Santa Eulalia watershed, 08.09.2015

Worries about climate change and legally established water use priorities are intrinsically rooted in the unclear legal status of water use rights from the tunnel. Even the hydropower company in charge acknowledges that formalization will be very difficult: "To formalize, the national water authority will decide according to national water law if there is enough water to give communities for irrigation. This will be difficult, because we have the water use right for non-consumptive use, whereas their use is consumptive and they do not return water to the river as we do. Furthermore, as co-owners with SEDAPAL we cannot decide over water uses".[29] Thus, SEDAPAL's water demand and official law are used to disclaim responsibility for possible future contestations, assisted by the ambivalent history of the water vents. At the same time, communities' water uses are put into an unfavourable position as they do not return water to the river like hydropower companies, but consume it. Acknowledging the difficult legal situation surrounding the vents, the local water administrator suggests that "it would be best if communities could just find other water sources" instead of insisting on formal use rights for the water from the vents.[30] Again, the communities are placed in a secondary position in the rural-urban water use hierarchy.

4.5 Evolving dynamics and the renegotiation of history

Though hydropower development and socio-territorial interventions may often trigger fierce negotiations and struggles, this research indicates that, historically, the Rímac watershed has been shaped by compromise and adjustments rather than conflicts. In particular, local communities' concerns are less about water quantities than about the distribution of costs and benefits. Claims of entitlements to benefits hinge on communities' historically rooted use and control of upstream water: "They bring everything to Lima, for drinking water and hydropower. But the water originates from here, from the community. They simply utilize it and make their business with it without paying anything. They do not care about upstream problems"; "Everything goes to Lima, so that they have water and light, to make their development possible. But the villages stay the same: no development, no change".[31]

[29] Interview engineer EDEGEL, 16.03.2016
[30] Interview local water authority, 04.04.2016
[31] Interview community member Santa Eulalia watershed, 16.03.2016

Despite discontent, open contestation over hydropower is rare and local communities sometimes portray themselves as helpless, which can prevent them from reacting creatively. It may even lead to condemning peer communities who do react against interventions in their territories. In the words of one peasant farmer: "In the other community they took over the hydropower company's camp during construction to paralyze the work. Those people are very difficult. Not even tourists want to go there anymore. We are different. We do not take over camps. We are quiet and solve problems in different ways, like human beings".[32]

Protests are thus stigmatized as undesirable and even damaging for community reputations, demonstrating how communities have internalized self-disciplining frames of 'correct behaviour' (Boelens & Seemann, 2014; Cleaver, 2018). However, to say that acceptance prevails in all communities would gloss over diverse realities on the ground. The president of one community, for example, declared that "we rent two cars and take all the farmers to Lima; in two minutes we will be on international television and tell how we don't get anything; and the people of the company will pay us […] I like to fight".[33] In some cases, community members living in Lima motivate communities to demand retroactive payment from companies for using communal territories and mobilize resources, for example accessing the National Archive for ancient land titles. Therefore, communities' proximity to Lima has manifold effects, entailing threats of losing water control but also offering diverse possibilities to contest in various ways and on various scales.

Along with growing urban water demands and changing perceptions about hydropower companies, which have come to be perceived and framed as profit seeking foreign companies that largely ignore local issues, rural communities' concerns are increasing. Hydropower companies that plan to construct new plants in the watershed now have to engage in lengthy negotiations with communities, who have become more sceptical towards any kind of intervention in their territory. These latest negotiations are not so much about rejections of hydropower but concern associated payments for land, compensation for construction damage, local employment during construction, agreements over water uses and other community support.

[32] Interview community member Santa Eulalia watershed, 17.03.2016
[33] Interview community member Santa Eulalia watershed, 20.06.2015

At the same time, concerns about future water rights and access are reinforced by climate change discourses circulating in Peru and in the Rímac watershed. Beyond general concerns about irregular precipitation patterns, peasant communities are aware that they share water sources with powerful players: "Lima depends on the same reservoirs as we do and they want to control and take charge of them. That is how we will feel the impact of global warming. We are worried".[34] Climate change implications for communities therefore involve growing competition for water resources, coupled with concerns about legal possibilities to claim water access and control in situations of shortage.

4.6 Conclusions

This chapter has shown that the construction of hydropower plants and related hydraulic infrastructure, together with the implementation of development projects in the Rímac watershed, was profoundly driven and sustained by selected visions of modernity promoted by Lima-based national and international elites. Hydropower development came to embody what was regarded as modernity: the subjection of nature to serve a modern city. Engineers acted as key promoters of this undertaking, applying their technical skills and rationality to overcome natural obstacles and to open the road to progress and modernity for both urban and rural populations, civilizing nature and people through inherently social and political technologies. The historical analysis, coupled with a deconstruction of current water management arrangements and socio-political relations between Lima and the Rímac watershed, contributes to conceptual discussions in several ways.

First, the empirical material has shown how hydraulic technologies are shaped and sustained by their particular socio-political and legal-institutional context, entailing inscribed power relations, social norms and modern imaginaries. Hydropower plants, reservoirs, water tunnels and diverted water flows have been engineered into humanised nature. Second, once installed, hydropower plants, reservoirs and underground water tunnels do not only change water flows, but also reconfigure surrounding territories in all their hydrosocial complexity. Socio-cultural, legal-institutional, economic and physical-hydrological arrangements are reconstituted. These changes need to be

[34] Interview community member Santa Eulalia watershed, 17.03.2016

considered as the outcome of contested interplays among imaginaries, discourses, institutions, actor alliances, infrastructures and reconstituted ecologies. As the case of the Rímac watershed has demonstrated, it is through modern water and electricity supply projects that rural and urban actors, rules and water become enlaced in one territory. Furthermore, this chapter has shown that territories are never stable. In Lima, new dynamics such as concerns about increasing competition over water resources, trigger questioning of socio-territorial arrangements and their histories. In this process, remembered history, which can differ significantly from archival history, has gained a renewed importance for claiming contemporary water use and control rights. Drinking water and hydropower companies, as well as peasant communities, mobilize different memories of hydropower development according to internalized ideas and their own particular positions within the watershed's territory.

This chapter has, furthermore, shown how urbanization is symbolic, social, material, multi-scalar and multi-dimensional, crossing conventional city boundaries and entwining the rural and the urban in a shared history, in which both are differentiated at the same time as they are connected. They are differentiated through their unequal socio-economic positioning and political hierarchization, steered by modernity and development discourses that contrast the rural as symbol of backwardness and the past with urban modernity and its utopian future. They are connected through hydraulics, normative and political institutions, and flows of water, people and ideas in both directions, from urban to rural areas and vice versa, in a relationship of increasing mutual dependence.

Either you bring the water to L.A. or you bring L.A. to the water.

Fictitious character Noah Cross, Head of the
Water Department and richest
and most powerful man in Los Angeles in the movie
Chinatown (1974)

Urbanizing rural waters: Rural-urban water transfers and the reconfiguration of hydrosocial territories in Lima

5.1 Introduction: Urbanization and urbanized waters[35]

"The decision was made: change the geography and crush the high peaks of the strongest hydrological boundary line, to enrich the Santa Eulalia watershed from the virgin sources of Marcapomacocha, an extensive highland, full of wild waters and lagoons."

"The battle in the dark tunnel, full of primordial smells set free by rock drills and dynamite, lasted fifty-six months. A tremendous, frightening battle against an enemy that wouldn't bow down: the water behaved in outright confrontation with those water seekers – a heroic deed by workers in the cordillera."

Hermann Buse in his book *Huinco 200,000 KW* (1965:87, 7)
describing the construction of the first trans-Andean water transfer to Lima

Whereas the previous chapter has scrutinized the historic development of hydropower in the Rímac watershed, this chapter focuses on the more recent hydropolitical changes in the area. These have been triggered by Lima's accelerating urban growth and the quest for ever more water resources for both urban (industrial and drinking) water demands as well as sustained hydropower production. Specifically, I analyse the history of the rural-urban transfers in terms of underlying imaginaries as well as concrete effects and resulting hydrosocial reconfigurations.

This study of rural-urban water transfers in Lima is embedded in worldwide academic and policy discussions about accelerating urbanization, ever-expanding mega cities and the associated challenges. Especially concerns about water and sanitation services in urban areas and equitable access figure prominently in scholarly literature and policy debate (Anand, 2011; Bakker, 2010; Banister & Widdifield, 2014; Gandy, 2004; Meehan, 2013; Swyngedouw, 1997). At the same time, urbanization processes also lead to severe pressure on natural resources in surrounding rural areas, especially when resources such as water are not easily available in the cities themselves due to, for example, climatic conditions or high urban demands (Cronon, 1991). As a response, numerous cities in different parts of the world implement large-scale water

[35] A previous version of this chapter was published as L. Hommes and R. Boelens (2017) Urbanizing rural waters: Rural-urban water transfers and the reconfiguration of hydrosocial territories in Lima, P*olitical Geography* 57: 71-80.

transfers, diverting water from regions ever-further away in order to provide cities with additional water resources (Kaika, 2006; Molle & Berkoff, 2006). While such water transfers may slake cities' thirst and, in some cases, also generate hydroelectricity, they raise major questions about sustainability, implications for rural areas and concerns of environmental justice between rural communities and expanding cities.

Lima, the capital city of Peru, is a remarkable case in which urban growth increases competition for water resources. Lima is home to one-third of Peru's total population, and the country's commercial, industrial and political centre. Situated in the coastal desert, the city heavily depends on water supply from the nearby Andean mountain range and the three surrounding watersheds of the Chillón, Rímac and Lurín Rivers (Riveros et al., 2014). In these watersheds water is also used for agriculture, industry, mining, hydropower and rural domestic uses, making water governance highly complex and contested (Autoridad Nacional del Agua, 2018).

'Water scarcity' in Lima is in fact a human-produced and politically-decided phenomenon rather than natural, affecting different populations within the same city unevenly (Ioris, 2012, 2016). Some neighbourhoods' water abundance, squandering and over-allocation mean a lack of sufficient good-quality water in others (Sara et al., 2017). More than one million inhabitants who live in the poorest urban periphery have inadequate access to safe drinking water and sanitation (Instituto Nacional de Estadística e Informática, 2010). They have interrupted hours of tap water, or rely on other water provision sources such as private water trucks that charge extremely high prices for often contaminated water (Schütze & Robleto, 2009). This is a mockery, considering that richer areas of the city fill rooftop pools, and over-water big parks and golf courses (Ioris, 2012).

Nevertheless, based on the imperative discourse that Lima generically needs more water, since the 1960s additional water resources have been transferred from the upper Mantaro watershed, a basin on the Amazon side of the Andes, to the Santa Eulalia watershed, which is a tributary to the Rímac River. While the first water transfer project was in fact implemented to provide extra water for electricity generation by the numerous hydropower plants in the Rímac basin as I have analysed in the previous chapter, Mantaro resources now supply a significant part of Lima's drinking water demands. There are currently three water transfer projects from the Mantaro watershed, called Marca I, III and IV, named after the first lagoon (Marcapomacocha) sending water to Lima (see Figure 2 in Chapter 1 for an overview of project locations).

The lagoon of Marcapomacocha still collects and regulates water coming from the system of canals, tunnels and dammed lagoons that make up the three Marca projects. From Marcapomacocha, water is transported through a canal and a 10 km trans-Andean tunnel to the Santa Eulalia watershed. The last water transfer project was inaugurated in 2012 by a public-private partnership between Lima's Water and Sewage Company SEDAPAL and EPASA (*Empresa Peruana de Aguas* - Peruvian Water Company); analysed in the last part of this chapter. Additional similar projects are planned for years to come so that large-scale water transfers will remain central to SEDAPAL's strategy to provide water for Lima (SEDAPAL, 2014).

Even though this complex infrastructure system plays a key role for water governance in the Lima region, very little is known about the history, mechanisms and interests that produced and maintain it. It is likewise unknown how the constructed hydraulic infrastructure reshapes hydrosocial territories in Lima's adjacent watersheds, impacting different water users' access and control over water resources and decision-making. This is striking and alarming, considering that water transfers and hydropower development often have deep socioeconomic, political and ecological impacts (Celio et al., 2010; Duarte-Abadía et al., 2015; Showers, 2002).

The aim of this chapter, therefore, is twofold. First, it scrutinizes the history of the water transfers and hydropower development in the Lima region and shows how specific imaginaries became materialized in infrastructure. Showing the power and concrete effects of imaginaries contributes to ongoing discussions about the conceptualization of hydrosocial territory with regards to its material, symbolic, discursive and cultural constitutions. Disclosing other legal and discursive mechanisms that have produced and supported infrastructure development until today will complement the historic analysis of imaginaries. Second, I focus on the effects this brings about, departing from an understanding of water transfers and hydropower structures as geographical forces that are physical, legal, symbolic as well as social in their effects.

The chapter is structured as follows. I will first briefly introduce the conceptual approaches that were decisive for this analysis, linking the notion of hydrosocial territories to the study of rural-urban relations and also devoting some additional attention to the multi-dimensionality of hydraulic infrastructure and the power of imaginaries. I then come back to the history of Lima's water and modernity dream that I have started examining in the previous chapter. This is followed by an analysis of current hydrosocial territory reconfiguration and the way it is underpinned by specific

discourses and legal, political and financial arrangements. Next, resulting implications for different water user groups' access to and control over water resources are examined for the case of the most recently implemented Marca Project (Marca IV - Huascacocha). The final section presents the conclusions.

5.2 Hydrosocial territories and rural-urban water transfers

As I have previously outlined, the notion of territory has moved away from being associated technocratically and instrumentally with nation-state boundaries, towards regarding it as a concept that encompasses material, symbolic and functional aspects (Escobar, 2008; Hassner, 1997; Lefebvre, 1991). As Agnew (1994) and Elden (2010) discuss, territory is at once judicial, political, economic, social, cultural, affective and physical. Accordingly, legal-political and social institutions, cultural relations, ideas and practices as well as physical structures and the environment make up multi-scalar networks that form territory (Brenner, 1998; Doucette & Lee, 2015; Jonas, 1994). Territories, procedural and interactional, evolve out of the power-laden encounter of, and negotiation between, different societal actors within the same time and space (Brighenti, 2010; Swyngedouw & Heynen, 2003).

The analysis of rural-urban water governance in Lima allows to draw particular attention to the ways in which imaginaries are more than merely symbolic or discursive aspects of territory but forces that become materialized in geographical projects and hydraulic infrastructure. Coming forth from powerful imaginaries as well as associated institutions and discourses, hydraulic infrastructure is material, social and symbolic in its origins and its effects, constituting an important force in rural-urban dynamics and territory-making in the Lima region. The notion of hydrosocial territories (see its definition in Chapters 1 and 2) allows to integrate the mutually enriching conceptual considerations about territories, imaginaries, socio-ecological systems and hydraulic infrastructure, in order to understand the territorial dynamics triggered by urbanization and associated demands for water and energy in Lima. Specifically, understanding hydrosocial territories as contested imaginaries and their materializations helps to grasp the territorial diversity that features a multitude of actors with diverging interests, territorial imaginaries and corresponding hydrosocial projects (Baletti, 2012; Barnes & Alatout, 2012). The continuous reconfigurations of political geographies of water governance and socio-ecological relations are at the centre of attention (cf. Grundy-Warr et al., 2015), including governmentality endeavours, cultural politics, and overt and covert contestation and subaltern strategies (for example Boelens, 2014, 2015b; Swyngedouw & Boelens, 2018).

The notion of imaginaries describes how divergent interest groups and actor alliances interpret current territorial constellations and how they need to be reconfigured in the future. Future visions entail clear aspirations and ideas of how hydro-technical and social plans must become realized through corresponding values, symbols, norms, institutions and social relationships. Imaginaries, thus, can be understood as the socioenvironmental world views and wished-for patterning of the material and ecological territorial worlds (Steger & James, 2013). Imaginaries are underpinned by discursively framed problem definitions; about what constitutes valid knowledge and what are 'good' water management approaches. Hirsch (2016: 65) details in an insightful recent paper about the Mekong region, how geographical imaginations and representations ("Mekong ontologies") have physical real-life effects, shaping water management outcomes. Yet, compared to ontologies and theoretical notions on existing orders of objects and the ties between them, hydro-territorial imaginaries are also intrinsically political and ideological interpretations and projections of how water, geography and people should be aligned and governed. To achieve realization of territorial imaginaries, interest groups take shape to combine economic, political and discursive resources. Especially the fact that mega-hydraulic infrastructure projects are capital-intensive and require modernist high-tech, forces the formation of interest groups and actor coalitions (see for example Molle et al., 2009).

Concerning the role of hydraulic infrastructure in shaping territories or forms of statecraft, numerous scholars have made important new contributions since Wittfogel's classic thesis on hydraulic despotism. Anand (2011: 551), for instance, explains how water "plays a critical role mediating the relationship between the government and the governed". In this chapter, however, hydraulic infrastructure is considered in a broader sense: as mediating not only the relationship between the rulers and the ruled but as a powerful socio-technical and cultural-political connector among different water users, territorial imaginaries, knowledge systems, and socio-ecological environments (Duarte-Abadía et al., 2015; Linton & Budds, 2014; Seemann, 2016; Vos & Hinojosa, 2016). Through the construction of dams, canals and hydropower plants, the Lima region's physical-ecological, socio-cultural and political-institutional relations become reconfigured. Reconfigurations resulting from hydro-territorial projects are disputed in multiple covert or overt ways and constantly negotiated in everyday practices, political-legal arenas and physical designs.

Nevertheless, the scope for negotiating social order and hydro-territorial schemes is, to a certain degree, restricted by the hydraulic technologies put in place. Though I

distance myself from technological determinism, technology design and construction embody and later facilitate certain types of social norms, behaviours, relationships and social requirements for use, while omitting and excluding others (Mollinga, 2003; Pfaffenberger, 1988; Winner, 1980). As Jensen and Morita (2017: 6) state, "infrastructures hold the potential capacity to do such diverse things as making new forms of sociality, remaking landscapes, defining novel forms of politics, reorienting agency, and reconfiguring subjects and objects, possibly all at once". Hydraulic infrastructures and the inscribed social norms are a powerful force, bringing about new configurations of spatially- and temporally-bound practices, networks and ideas. The construction of infrastructure and water management arrangements is thus always a reflection of political interests and discourses (Kelly-Richards & Banister, 2017).

The conceptual notion of hydrosocial territories is, in this chapter, applied to understand the reconfigurations of rural-urban hydrosocial territories triggered by urbanization processes and politics. In that regard, the research is embedded in literature that unpacks how urban development is intrinsically based on the appropriation and transformation (or: 'urbanization') of nature. Cities are seen as encapsulated in networks of environmental, political, economic and social relations that exceed their conventional boarders and geographies (Anand, 2011; Cronon, 1991; Gandy, 2004). Such appropriations and transformations of nature through urbanization processes often take place under the banner of modernity and progress. As elaborated before, infrastructures thus operate at levels of imaginaries and desire, representing "the possibility of being modern, of having a future" (Larkin, 2013: 333; cf. Banister & Widdifield, 2014). This results in tensed, conflictual relationships between geographical imaginations of modernization and urbanization, and the actual social, economic and ecological costs generated by modernity imaginations (Illich, 1985; Kaika, 2006). Theorizing urbanization as a complex, multi-scalar, multi-dimensional process has been done by several political ecology scholars (Kaika, 2005; Swyngedouw, 1996; Swyngedouw & Heynen, 2003). Yet, many studies do not take analyses beyond city boundaries but focus on nature or water within the city (see for example Anand, 2011; Ranganathan, 2014). This chapter sets out to move beyond the city to focus on a political ecology of urbanization (complementary to a political ecology of the city) and, thereby, show how urbanization differentiates as well as intertwines city and countryside (Angelo & Wachsmuth, 2015).

5.3 A historic hydraulic mission: Imaginations of Lima as the illuminated garden city

Hydraulic infrastructure as present in the Lima region today is outcome and materialization of specific ideas, imaginaries and desires that date back to the early 20th century, which I have also analysed in detail in the previous chapter. Analysing how territorial claims of hydropower companies and Lima's drinking water company have evolved through time allows depicting the way in which nature was transformed under banners of modernity and progress. It also illustrates how territorial reconfigurations originate in powerful imaginaries about people and the environment in the Lima area, with effects that endure until today. At the same time, the fact that the original transfer idea did not become realized as it was shows how imaginaries do not automatically turn into territorial projects, but need additional financial and political resources mobilized to their advantage.

The first one to call for transferring water from the Mantaro valley to the Rímac watershed was electric engineer Santiago Antúnez de Mayolo, to today celebrated as the pioneer of hydropower development in Peru. Already in 1929, he explained that "Lima, the 'Pearl of the Pacific', needs to bedeck herself at night with potent bundles of light shining over her and neighbouring populations" (Antúnez de Mayolo, 1929: 1). Some years later, he added that not only light is needed but also food supply: "What concerns Greater Lima, […] her fundamental problem, worsened by speeding urban growth, will always be food supply" (Antúnez de Mayolo, 1953). Accordingly, Antúnez de Mayolo proposed an ambitious engineering project to dam Junín Lake, Peru's second-biggest lake and now a national nature reserve, and divert its waters through a 40 km trans-Andean tunnel to Lima's coast. What is remarkable is that this massive hydraulic engineering project did not primarily aim to supply drinking water to Lima, but to enable the development of large-scale irrigation on the coastal desert land around Lima. Water use for hydropower was an additional side effect. Antúnez de Mayolo argued that land lying bare was a waste of national resources, needing to be developed to grow cotton and sugar for export and to ensure food security for Lima:

> "The Peruvians of tomorrow […] will lift up the monument of granite which will eternalize the heroic deed of the epigones who achieve such a gigantic work, to fecundate the desert wasteland […], provide light and power and, in general, to increase the richness, comfort and beauty of Greater Lima, the Garden City of the southern Hemisphere" (Antúnez de Mayolo, 1953: book cover).

This reveals, first, a glorification of engineering work as utopian-inspired hydraulic heroism (cf. Boelens & Post-Uiterweer, 2013); second, the vision of a desert to be fertilized by water, no matter from where (cf. Maas & Anderson, 1978); and third, envisioning Lima as the modern place-to-be, with abundant food, energy and water resources. At the same time, this vision contains an imaginary of a hydro-territorial disequilibrium of fertile lands and population on the Pacific coast and water resources in the Amazon basin – a disequilibrium to be overcome by modern technology and the conquest over nature (cf. Swyngedouw & Boelens, 2018). For example, the national El Comercio newspaper stated that "[The water transfer] attempts to equitably balance the water abundance and scarcity originating from the 'divortium aquarium' of the Andes" (El Comercio, 1950). Such discourse about water transfers from the (Amazon-flowing) Mantaro watershed to balance the mismatch between people, arable land and water resources persists to this day, as most reports about Lima's water situation start by observing that one-third of Peru's total population lives in the capital city, while only 2.2% of the nation's water resources are found there (see for example Aquafondo, 2013; Riveros et al., 2014).

While these numbers might roughly represent empirical water flows, such a portrayal hides possible downstream effects under imaginaries of abundance and scarcity. A possible distribution dilemma *within* the two geographical areas, in which more water for one user means less for another, is brushed away, further justifying the transfer of water as an endeavour to serve up justice in an "unjust natural system" (Headline in national newspaper *El Comercio* (Buse, 1959: 3)). Embedded in such strong discourse and imaginaries, it becomes difficult to challenge or question the transfers. This is further reinforced by deep beliefs in the superiority and fundamentality of engineering science for modernity and progress. Characteristic quotes speak for themselves: "The application of engineering science as an activity is intensively bound to industrial progress and economic wealth" (El Comercio, 1950) and "Transforming the dramatic topography of the Andes – hostile barrier to Peruvian man and his life needs – is a singular ambition and idealistic goal, driving force of progress for a beautiful metropolis" (Gino Bianchini, former director of Electric Companies at the inauguration of the HPP Huampaní (Bianchini, 1965)).

However, Antúnez de Mayolo's idea did not materialize after all. His plan was seen as too ambitious as it envisaged a 40 km long tunnel through the Andes and lacked financing. Furthermore, according to a SEDAPAL representative, social protests around the Junín Lake were a reason not to realize the project.[36] Later, the idea to transfer water

was picked up and adjusted by the Swiss engineer Pablo Boner who was working for the Associated Electric Companies of Lima (see portrait in the previous chapter). De Mayolo and Boner knew each other, even though they never directly collaborated.[37] Boner was well aware of the earlier transfer design. In an interview he was sceptical, arguing that more hydro-geological studies would be necessary and that, furthermore, Antúnez de Mayolo's idea for financing tunnel construction would be difficult to realize (El Comercio, 1950). Boner's emphasis was clearly on transferring water to be used first and foremost by hydropower, and not on benefits for the agricultural sectors, as was Antúnez de Mayolo's idea. The fact that Boner, since the 1930s, had led the construction of four hydroelectric power plants in the Santa Eulalia and Rímac watersheds is likely to have influenced his opinion (Boner, 1949).

Accordingly, Boner designed a different water transfer that would tap the closer Lagoon of Marcapomacocha (upper Mantaro watershed) instead of Lake Junín, and transfer its water through open canals and a 10 km tunnel to the upper Santa Eulalia sub-watershed. The project, which came to be known as Marca I, was inaugurated in 1965 and had the explicit objective to provide water to hydropower plants as a supplement to the irregular river and rainfall regime of the Santa Eulalia. Drinking water supply for Lima and possible irrigation water figured as minor matter only (Empresas Eléctricas Asociadas, 1959). Increased and steady electricity production was regarded as more important concern for an expanding city.

What was essential for the realization of this project, which set the cornerstone for the two following water transfer projects, was that Boner managed to convince foreign investors to support the project with financial resources. Besides funds from the International Bank for Reconstruction and Development, Swiss support played a key role (Empresas Eléctricas Asociadas, 1960).

Already in earlier difficulties of the Electric Companies in the 1930s, Boner and his colleagues were able to mobilize Swiss capital to finance the expansion of hydropower in Lima (Cámara de Comercio Suiza en el Perú, 1991). In fact, much of the board of directors and leading engineers of the Electric Companies as well as the associated company Hidrandina were composed of Swiss and Italian expats with good relations with Swiss banks, companies and investors. These relations and conjoint business

[36] Interview Department of Research & Development SEDAPAL, 17.08.2015
[37] Interview A. Boner, 26.04.2016

ventures were part of a broader Swiss involvement and economic aspirations in Peru, which helped to find support for the water transfer project (Cámara de Comercio Suiza en el Perú, 1991; Sanders, 2015). As one of Switzerland's main daily newspapers declared with pride: "The exemplary electricity supply of the two million city Lima is fundamentally the work of Swiss mind", "a piece of Swiss homeland exerted with grandeur in the distance" (Neue Zürcher Zeitung, 1964: 6). In comparison to such broader support for Pablo Boner, Antúnez de Mayolo's idea and imaginary clearly lacked necessary financial and political resources.

Marca I was a milestone for Lima's and also Peru's water management: it showed that engineering can win over nature and put nature at the service of modern cities and progress. Hermann Buse's landmark book *Huinco 200,000 KW* (1965) describes this process of transforming river flows and landscapes. His account is marked, on the one hand, by a vision of nature as hostile enemy; and on the other hand, by a personification of nature that also expresses respect for nature's forces. For example, he describes the construction of the trans-Andean tunnel as a "battle in the tunnel" (p.55), "a tough fight against the masses of rocks" (p.55), an "attack against the mountain range" (p.93) and at the end, the "final victory" (p.105) of humans over nature, with the result that "humans modify geography" (p.85). At the same time, subterranean streams exposed during perforation works are portrayed as "invisible veins of the mountain" (p. 55), which shows how the landscape is personified and compared to a human body. As I have shown in the foregone chapter, before the conquest of nature by engineering science, workers and machinery, the river is merely an uncontrollable savage. It is only once transformed into a hard worker that the waters are bestowed with awe for force and contribution to the advent of modernity: "The Rímac and the Santa Eulalia […] the most hard-working rivers in the world" (p. 3). Or, as the former director of the Electric Companies put it: "The works that give fructuous discipline to the water flows of the Santa Eulalia and Rímac Rivers arise like awe-inspiring holy altars for the progress of the Nation" (Bianchini, 1965; emphasis added).

Again, Buse's book is not an isolated documentation or vision. Besides his numerous publications and homages in the main national newspaper El Comercio (Buse, 1959a, 1959b; El Comercio, 1960, 1968) that have informed public opinion, many similar accounts exist. For example, a Spanish journalist cited by Antúnez de Mayolo (1953), exclaims: "What an immense triumph for the persistence of Peruvian engineers, viewing one day […] the water abundant Mantaro dominated by science and subordinated by genius!", depicting big admiration for engineers' ability to dominate and civilize

nature for progress and development. At the same time, Pablo Boner himself expressed modesty about his accomplishments as opposed to the rivers' contribution. According to his nephew and former colleague, he accepted the Peruvian Cross of Merit only reluctantly, saying: "It was not me who made the mountains".[38] These accounts show the dualism between respect for nature's forces and regarding nature as an enemy; something peculiar and often overlooked in literature on the hydraulic mission and the glorification of engineering.

As has been indicated, the first water transfer did not primarily focus on drinking water supply for urban Lima. The missing consideration and importance of drinking water supply for Lima City's population given the then still sufficient locally available water resources and the much smaller population, explains why the drinking water company SEDAPAL was not involved, even though it is nowadays commonly assumed that they initiated all Marca projects. Accordingly, to this day, SEDAPAL does not actually own the central node of the hydraulic infrastructure system supplying Lima City with water: the trans-Andean tunnel. Nevertheless, with raising concerns about urban water supply, SEDAPAL became involved in two water transfers: for Marca III (1999) as co-financier and for Marca IV (2012) as main implementer in a public-private partnership. Thus, supposed needs and objectives changed; so did mechanisms that sustain and further drive trans-Andean water transfers. This is analysed in the following section, building the bridge to an analysis of the current situation by means of the study of the most recently implemented water transfer.

5.4 Emerging water control in the Mantaro and Rímac watersheds

Once installed, the infrastructure systems in Lima have been accompanied and justified by changing objectives, actor alliances and mechanisms. On the one hand, this shows how imaginaries, discourses and mechanisms surrounding and sustaining particular infrastructure are changing throughout time and are not as fixed as their materialities seem to suggest. On the other hand, it also demonstrates how the same infrastructure development continues to be implemented despite the governance context, only on different grounds. Disclosing how additional legal and discursive mechanisms have produced and supported infrastructure development until today thus complements the historic analysis of imaginaries.

[38] Interview A. Boner, 26.04.2016

With the increasing involvement of Lima's Drinking Water Company SEDAPAL, an institutional and discursive system evolved around the water transfers that is underpinning and moulding ongoing territorial reconfigurations. The following analysis of changing actors, justifications and mechanisms shaping the transfer of water to the Limenian coast focuses on three main aspects. First, the way in which transfers reconfigure ownership arrangements over water and its regulation. Second, how these arrangements become institutionalized, thereby invisibiliing transfers as well as de-territorializing water resources. And third, how the acknowledged inherently political and contested nature of the water transfers is being neutralized through discourses of water scarcity in the area where water is conducted to, and discourses of cultural backwardness in areas from where water is obtained. The identified components exist as a powerful combination that reconfigures rural-urban hydrosocial territories in the Lima region.

Institutionalizing and invisibilizing extractive transfers and claiming territorial control

With time, water transfers from the Mantaro basin to Lima have become embedded in and sustained by a legal-political system that facilitates them and makes contestations increasingly difficult. Most importantly, the water transfers have led to a changed understanding of water ownership. Whereas Peruvian law establishes that water is property of the Peruvian nation and that there may not be any private property over water (Water Resources Law, 2009), the water flowing in canals of the two companies is seen to belong to the companies – at least for the part of the watercourse where water is conducted in pipelines and canals (most of the Santa Eulalia and Rímac Rivers). "We own and administer the water as long as it flows in one of our canals", explains a SEDAPAL representative.[39] A hydropower engineer confirms: "Together with SEDAPAL we are co-proprietors".[40] The Rímac Water Users Association president explains how this can lead to arguments between downstream water users and companies: "EDEGEL and SEDAPAL are regulating discharge now. They make these mega projects; everything is private […]. We are not using the water from this infrastructure, because we use the Rímac River's natural flow […]. But sometimes, they complain and say that we are stealing their water; but that is not true. […] I am not interested in their water but I do respect it".[41] Thus, waters that are regulated through hydraulics have

[39] Interview representative SEDAPAL, 17.08.2015
[40] Interview engineer EDEGEL, 16.03.2016
[41] Interview president Rímac Water User Association, 22.09.2015. EDEGEL changed its name in 2019 and is now called ENEL Generación Perú. Since 1995 it is owned by the Italian multi-national electricity company ENEL

become property of those actors that have designed and constructed the hydraulics. Such forms of 'humanizing water' through hydraulic investments often constitute the fundamental part for establishing categories of ownership and property in the region. Accordingly, drawing boundaries between what is natural and what is social is itself part of struggles over water.

Corresponding property manifestations can be found all along the system: locks on water gates, barbed wire around parts of the Marcapomacocha Lagoon and legal-administrative arrangements secure the boundaries of 'appropriate uses' and 'rightful appropriation'. Where river and transfer water is currently still flowing in the riverbed (in the lower Rímac watershed, below the Huampaní hydropower plant), a project is planned to also conduct water in tunnels (Céspedes Alarcón, 2014). Tellingly, the project is strongly opposed by the Rímac Water User Association, which fears less water availability and restricted control over water flows for other water users.[42]

The legal-administrative arrangements further alienate and de-territorialize water resources from their geographic origins and thereby also from their possible political implications and effects on other water users (cf. Banister & Widdifield, 2014). For example, licenses to water and electricity companies do not specify water sources but simply authorize intake of "surface waters coming from the Rímac River" (*Resolución Administrativa No. 119-95/AG-UAD.LC/ATDR.CHRL*, 1995) even though the water quantity (here, 20 m^3 per second) clearly indicates that part of it comes from the Mantaro. The water law and issued licences thereby appropriate water from the Mantaro watershed, subtly redefining it as originating from the Rímac River and obscuring the fact that large volumes of water flowing through the Santa Eulalia watershed in fact come from the Mantaro watershed. Attention and questions about water transfers are averted.

The powerful downstream perspective disregarding actual water sources is also manifested in authority structures and accompanying responsibilities established to grant water use licenses: the Local Water Authority of the Mantaro watershed is not formally responsible for issuing the licenses, but the Local Chillón Rímac Lurín Water Authority. The regulation states that "the administrative procedures in water matters are initiated by […] application to the Local Water Authority in whose jurisdiction the water will be used. If the natural source of the water and the possible intake point

[42] Interview president Rímac Water User Association, 22.09.2015

are situated in the jurisdiction of another Local Water Authority, their opinion will be inquired" (MINAGRI & ANA, 2010, p. 5). Thus, the Mantaro Water Authority's opinion about availability of water resources for a transfer is taken into account but the factual authority to issue or reject licenses lies with Lima's Water Authorities. In the process of assessing water availability, upstream communities without formally registered water rights (which many reject due to fears of payment obligations) may potentially have disadvantages. Although Peruvian law recognizes and respects peasant and native communities' water use rights it is unclear how such recognition is taken into account in actual bureaucratic practices. Customary, socioterritory-based water rights notions, as held by many Andean user communities, are commonly dismissed in everyday practice (Boelens & Seemann, 2014; Roa-García, 2014).

Water transfers are also facilitated by the Water Law's prioritization of water uses, which ranks drinking water first in accordance with the international discourse on the human right to drinking water and the Sustainable Development Goals. In consequence, SEDAPAL's water claims will always have legal priority even though part of the drinking water is used for tourism and industrial activities or to water parks. Conversely, Andean communities' customary water uses are classified as lower-ranking irrigation use.

Finally, water is formally national property and water for Lima is national priority, so mega projects in the Mantaro watershed are legalized by supreme decrees signed by the President himself. This gives substantial political and legal weight to projects, sometimes leading to a sense of helplessness and subordination among people affected by projects. One community member affected by the Huascacocha project explains: "There was a supreme decree issued by the government, so what can we do against the project? We cannot do anything".[43] Thus, hydraulic projects are by no means illegal undertakings but are part of a broader legal-political system. In this hydro-territorialization process, hydraulic projects shape the need for and contents of legislation, which enables and institutionalizes extractive water practices and infrastructure development.

Neutralizing the political through discourses on water scarcity and cultural backwardness

Since the 1990s SEDAPAL representatives acknowledge the political nature of the water transfers by admitting that much coordination and explication work is needed to convince rural communities to accept the projects. However, up to this

[43] Interview community member, 26.08.2015

day, communities' doubts or opposition to transfer projects are commonly reduced to matters of ignorance. For example, in one interview, a representative of SEDAPAL stated that "Megaprojects are all about coordination with peasant communities. They must be sensitized".[44] A similar vision has been present since the implementation of the first water transfer explicitly aimed at providing drinking water. As the following from the SEDAPAL book *Land of Lagoons* demonstrates (published on the occasion of inaugurating Marca III), rural communities are portrayed as in need of integration and a dose of reality, which the promising Marca III project is imagined to bring. Any opposition is seen as indifference or ignorance, easily resolved by education and sensitisation: capacitating the incapable.

> "Living in a natural paradise, they [communities in the project region] find themselves a bit distant from the reality which our country lives, and even more so from the destitutions and necessities of other Peruvian regions. Accordingly, their initial attitude was one of indifference towards the great project that will benefit the regions of Lima and Callao with new water sources. […] We thus began a long road of negotiations with communities in Yantac, who turned out to be distrustful and worried about the possible negative effects of the project in the zone. […] Nevertheless, SEDAPAL […] planned a series of actions to benefit the community […] such as this book, which documents a historic compilation of the Andean highland communities' archaeology, culture, folklore, flora and fauna, and which furthermore has the value of striving to integrate the most remote communities and those least informed about the country's reality. […]
>
> Explanations about the project's kind-heartedness and the seriousness of SEDAPAL's commitment conquered local leaders' resistance, and they made the historic decision to facilitate this project, which offers the solution to one of the biggest problems for Peru's capital city"
>
> (SEDAPAL, 1998: 17–18)

[44] Interview representative SEDAPAL, 07.09.2015

Thus, projects that cut through local territories to supply water to the downstream city build upon a socioterritorial imaginary in which the countryside is of abundant resources and backwardness, and the city a place of cultural richness (civilized society and progress) paired with water scarcity (cf. Wachsmuth, 2012). The city is equated with scarcity and progress; the country with abundance and backwardness. While being clearly differentiated, city and county are, at the same time, also connected through actual water flows and infrastructure construction. "Socionatural processes spanning city and countryside differentiate the two at the same time as they connect them" (Angelo and Wachsmuth, 2015: 25). Another aspect, which is an essential driving force for the reconfiguration of hydrosocial territories in the Lima region and which connects to the particular country-city distinction, is the water scarcity discourse. The narrative of Lima being the second biggest desert city in the world after Cairo is announced at the beginning of almost every presentation or pamphlet by SEDAPAL and other international and national institutions working in the area (see for example Aquafondo, 2016; Pasco-Font, 2015). What often remains unmentioned in such a narrative is the inequality in water access within the city: while more than one million inhabitants in Lima still lack access to public drinking water and sanitation systems, in the most exclusive neighbourhoods pools are filled and parks extensively irrigated (Ioris, 2012). Yet, a general water scarcity narrative, which emphasises water deficits because of growing urban water demands and Lima's location in a desert, obliterates these inequalities within the city and instead justifies investments in massive water supply projects (cf. Lynch, 2013). As a result, the water transfers are promoted as charitable 'water for all' projects even though the water often does not reach those most in need. With the category of 'the thirsty city Lima', the voices of marginalized populations disappear, and city and countryside categories become part of a particular politics of scale.

Together with a discourse about water abundance in the Mantaro watershed, the water scarcity discourse justifies the continuous expansion of Lima's water supply system. The complexity of the water problem is reduced to a rather simple – or at least unambiguous – distribution problem between two large geographical areas: the desert coast and the Amazonian basins. Possible water distribution dilemmas within these geographical areas remain unmentioned. This is to say that not for everybody living on the Amazonian side of the Andes water abounds. For example, in the city of Cerro de Pasco, which is located close to the last water transfer Huascacocha (Marca IV), water access and supply is a massive problem (El Comercio, 2014).

The specific framing of the problem (distribution) and the solution (re-distribution) on rather large and simplifying scales, delegates other approaches to tackle the so-called water crisis in Lima to the background. For example, the multi-stakeholder LiWa project (2008-2014), of which SEDAPAL also formed part, identified different steps towards a more sustainable water future in Lima, of which none explicitly included the acquisition of further Mantaro resources. Instead, the action plan points, amongst others, to the high water losses within the urban water distribution system that can be addressed through maintenance works and fixing of leakages; the big and still unexplored opportunities for reusing treated waste water; demand management through adjusting the water tariff structure; and massive awareness raising campaigns amongst consumers (León, 2013). Even though steps are made in these direction, for example with water loss reduction programs and small-scale pilot projects for the reuse of waste water, water transfers continue to be a popular option. Bell (2021) argues that such linear orientation is deeply rooted in the historic patterns and institutions of Lima's water supply. At the same time, it is also likely that the transfers and other visible and marketable water projects have remained popular because they are more easily functionalized for political purposes (cf. Harvey & Knox, 2015). National politicians can more easily gain votes with inaugurating a water transfer than advocating maintenance works of underground pipes that are less visible in everyday life and people's consciousness. As former Peruvian president Ollanta Humala explained during the inauguration of the Marca IV transfer project: "With this type of [infrastructure] works we are constructing trust" (RPP Noticias, 2012).

After having analysed legal and discursive mechanisms that have produced and supported infrastructure development until today, the focus is now on the material, social and symbolic effects of the associated territorial reconfigurations through a closer study of the latest water transfer project Marca IV.

5.5 Diverging implications for different water users and the case of the Marca IV projects

What specific effects do water transfers actually produce locally? Are rural communities left without water? Who is benefiting, who is disadvantaged? The following section analyses these questions for the most recently implemented transfer project. The "Huascacocha-Rímac Derivation" project, also called Marca IV, was inaugurated in 2012 by then president Ollanta Humala, as the first water transfer implemented in

the Mantaro watershed by a public-private partnership. The twenty-year concession involves planning, operation and maintenance responsibilities as well as negotiations with local communities. The Peruvian Water Company EPASA (*Empresa Peruana de Aguas* - Peruvian Water Company) is, other than the name suggests, a consortium of two subsidiaries of Brazilian construction giant OAS. The project involves a 15 meter high dam in the natural Huascacocha Lagoon, from where a canal conveys water to the Marca III system and then to the Santa Eulalia watershed (see Figure 2). A total of four rural communities are considered to be affected.

Communities claim negative effects of the project and explain that negotiations about compensation have been unfair, with unequal negotiation skills between experienced EPASA lawyers versus inexperienced communities; that more pasture land than originally agreed upon has been flooded without compensation, and that canals endanger humans and animals while crosscutting territories and impeding livestock movement and grazing. One member of a local community close to the Huascacocha Project, for example: "The canal and the project have divided our territory. The company has divided as they pleased. Today a lot of cars pass through here and at the same time our animals cannot pass as they used to".[45] In one community, water access problems exist: "Now there is no more water for us, especially in summer […] we experience water shortage, leading to deaths of alpacas. So we are in conflict with the company. […] The agreement says that they should only collect the water harvest from the winter rains and divert this, but in reality they divert everything and leave nothing for us".[46]

Besides these concerns, communities and the regional government in the project area regard it as unjust that millions of dollars are invested in the project, while at the same time local communities are left without safe local drinking water systems. "In the region of Pasco we don't have water; they take most of the water to Lima. They deceived us (…). There is no benefit for us from the project, no support. How much might they be earning with it? While we live like this ….".[47] Especially in the nearby city of Cerro de Pasco, drinking water is a major issue as it is only provided a couple of hours a day. Much water is, therefore, supplied by private water tanks which makes water in Cerro de Pasco on average the most expensive in all of Peru (El Comercio, 2014). As a

[45] Interview community member 26.08.2015
[46] Interview community member 27.08.2015
[47] Interview community member 27.08.2015

result, the Regional Government and an NGO from Pasco have also become involved in the debate around Huascacocha and other future water-transfer projects, arguing that transferring this water deprives Cerro de Pasco of any future possibility to use the water for their own drinking water supply: "SEDAPAL didn't bring any benefit for us. For example, they should have provided water to the villages because many have neither drinking water nor a sewage system".[48] Likewise, an NGO representative: "We have a long-term vision and are afraid that one day the coast may have water while we are left with nothing; because the water of this region is not inexhaustible".[49] This shows how concerns connected to the Huascacocha transfer project are partly about possible local water shortages in the future, but also about the perceived unjust gap between investments for Lima and for community needs. Local drinking water problems stand in stark contrast to skyrocketing investments for Lima, and leave communities and regional institutions with a sense of being secondary citizen.

Yet, overt contestations about these issues are rare. Complaints are expressed verbally and in written form, but in general an imaginary about non-contesting and accepting communities prevails. Some blame this on the area's long mining history that is said to have weakened community ties (cf. Stoltenborg & Boelens, 2016) others see communities as helpless versus projects of national priority. Others say that hopes for benefits and local employment generation prevail, despite scepticism about whether benefits will become a reality: "These companies don't recognize communities; our complaints and our situation mean nothing to them".[50] Even though one can certainly not talk about an open water conflict or struggle, the above outlined project implications and perspectives have questioned the imaginary of the "Land of the Lagoons" as a land of untapped resources that simply requires investment, hydraulic infrastructure and sensitization of rural communities.

It is important to mention that since the research for this chapter was conducted, there has been increasing attention to the upstream areas of the Chillón, Rímac, Lurín and Mantaro watersheds. Specifically since 2015, SEDAPAL has been obliged by law and the regulator SUNASS (*Superintendencia Nacional de Servicios de Saneamiento* - National Superintendency of Sanitation Services) to collect money via the urban water use tariffs for implementing a system similar to Payment for Ecosystem Services (PES) projects in

[48] Interview Regional Government Pasco, Department of Natural Resources, 26.08.2015
[49] Interview Centro Labor Pasco, 25.08.2015
[50] Interview community member 26.08.2015

the upper watersheds. The focus is, amongst others, on improving water infiltration capacities and preventing soil degradation (for example caused by overgrazing) to eventually increase year-round water availability for local communities and the city of Lima (Programa Bosques Andinos, 2018). However, as Bleeker and Vos (2019) show, the process of designing these PES-like schemes continues to be dominated by urban stakeholders, interests and perspectives, taking local rural knowledge, needs and land ownership complexities only partially into account. On a more optimistic note, the prospective implementation has led to several media reports about the sources of Lima's water (see for example Alvarado et al., 2017; Mendoza, 2016), which has the potential to create a broader awareness of the importance of these rural areas for Lima. The exact outcomes of the yet to be implemented watershed projects need to be closely monitored in the coming years.

5.6 Conclusions

The chapter set out to scrutinize the ways in which urbanization processes and associated hydraulic infrastructure projects in the region of Lima drive a profound reshaping of rural-urban hydrosocial territories, differently affecting water user groups' access to and control over water resources. The analysis of the history of water transfers in Lima shows how objectives for water transfers have changed over time and how specific discourses have substantially supported megaprojects: about engineering as a silver bullet to balance a 'natural disequilibrium', about the need to put every drop of water to productive use, and about the aspiration to turn a desert city into an illuminated garden. Such analysis allows to decipher and unmask hydraulic systems as being far from a logical consequence of Lima's location in a desert. Instead, imaginaries about city and countryside, water scarcity and abundance, and about progress and backwardness are at the core of the water transfers in the Lima region. However, while certainly very powerful, it has also been demonstrated that imaginaries do not automatically turn into geographical forces as such, but require further financial and political support to become materialized. Thus, only those who can mobilize these elements in conjunction will be able to reshape hydrosocial territory according to their interests and ideas. In effect, rural water users are confronted with the consequences of the territorial reconfigurations resulting from Lima's upscaling search for water supplies beyond its geographically corresponding watersheds. While the infrastructure system and legal-institutional government techniques mean control and access for hydropower and drinking water companies; they imply dependence

and/or exclusion from the benefits for rural communities. Beyond questions of outright water grabbing, local communities' loss of decision-making power and control over their territorial waters as well as the distribution of water-related benefits are central.
Besides its empirical contribution, the chapter has shown how cities' very own geographies are actively constructed through discourses, imaginaries and resulting infrastructure projects. Specific scarcity and abundance discourses as well as scale categories and what is to belong to 'the city' are defined by actor alliances with discursive, political and financial power who can then cement these imaginaries in hydraulic infrastructure. In these processes of territory-making, openly political and disruptive water supply projects are powerfully institutionalized and justified, also naturalizing complexities and politics of water crisis. Yet, as an addition to scholarship that depicts infrastructure as tool to subjugate populations and extend state control, the conceptual notion of hydrosocial territory emphasizes the territorial diversity existing within one and the same geo-political space, which in turn leads to considering territorial reconfiguration as an ongoing process of negotiation and struggle.

Hay distintas formas de mirar el agua,
depende de cada uno y de lo que busque.

There are different ways to look at water,
it depends on the person and what they are looking for.

Julio Llamazares in the book
Distintas formas de mirar el agua (2015: 105)

The ageing of infrastructure and ideologies: Contestations around dam removal in Spain and the temporalities of hydraulic infrastructure

6.1 Introduction: Aging infrastructure, new questions[51]

Water dams, big or small, have received a lot of attention in politics, social movements and political ecology scholarship. Numerous studies – such as the ones presented in the previous chapters – analyse how dams are saturated with power and politics. Scholars have focused on unpacking the actor alliances, mechanisms and modern imaginaries that form the basis of dam construction (Hidalgo-Bastidas, 2019; Kaika, 2006; Menga, 2015; see also Chapters 3, 4 and 5), the conflicting knowledge paradigms and epistemological controversies surrounding mega-infrastructures (Shah et al., 2019, 2021), as well as the fierce contestations from affected communities (Del Bene et al., 2018; Duarte Abadía et al., 2019; Flaminio, 2021). Again other studies have helped to shed light on the devastating effects dams can have for environments and people alike, questioning their promise of bringing modernity and development.

While dam construction continues to boom in many parts of the world, especially in North America and parts of Europe there is an increasingly loud-voiced promotion of the opposite: dam removal. Dam removal (sometimes also referred to as barrier removal) is used as an umbrella term, promoted since the 1990s, to describe the call for demolition of diverse in-stream barriers such as weirs, sluices and dams. How many 'dams' have been removed up to now depends on one's definition of what counts as a dam. When considering all kinds of in-stream structures that impede free river flow, more than 5,000 of them have been removed in the past years according to Dam Removal Europe, which is a network founded in 2015 by organizations such as the World Wildlife Fund, The Nature Conservancy, Rewilding Europe and the World Fish Migration Foundation (Dam Removal Europe, no date). The removals of in-stream structures are promoted under different banners, ranging from security and economic concerns to biodiversity and water quality considerations. Commonly, promoters refer to the European Union Water Framework Directive's objective to achieve 'good ecological status' for surface and groundwater to make their case (Dam Removal Europe, 2020). More recently, the idea has gained additional policy support on European level through the EU Biodiversity Strategy that sets out to restore at least 25,000 km of rivers into free-flowing rivers by 2030 "through the removal of primarily obsolete barriers and the restoration of floodplains and wetlands" (European Commission, 2020: 12).

Dam removal as a concrete action proposal for river management is relatively new

[51] This chapter is currently under review at *Water Alternatives* as L. Hommes, The Ageing of infrastructure and ideologies: Contestations around dam removal in Spain and the temporalities of hydraulic infrastructure.

and ground breaking. However, the debates and contestations it sparks about nature, the nature of humans and desirable nature-society relations have occupied societies, politicians and philosophers throughout history. Maybe most famously, already in 1755 the Genevan philosopher Rousseau called for an alternative, more natural way of life in which people would free themselves from corrupting civilization in order to lead a more natural and thus satisfied life (Rousseau, 1755 [2019]). Also in natural and water resources management calls to go back to pre-industrial or pre-modern practices and states of things have been and continue to exist. In India, for example, anti-dam movements in the 1980s mobilized ancient water technology and practices to challenge modernity (and dams as its materialization) and provide a presumably desirable and viable alternative, which was imagined to be more equitable and more sustainable (Shah, 2012). Likewise, in Peru Incan and pre-Incan water technology has lately received increasing attention from international agencies (Grainger et al., 2019). Yet, as Shah (2008, 2012) critically analyses, such calls for a comeback are based on particular imaginations of the past and the present that are not always historically accurate. Furthermore, they produce a problematic binary opposition between the modern and pre-modern.

In this chapter, I aim to relate currently promoted dam removal to some of these previous socio-historical discussions, and at the same time bring it in conversation with ongoing scholarly debates in water governance studies. Specifically, I show the importance of more explicitly considering different temporalities (including infrastructure removal) in studies on hydraulic infrastructure. I also place dam removal in wider debates about (failed) promises of modernity associated with hydraulic infrastructure. Lastly, I demonstrate how diverse and conflicting views about 'nature' and 're-naturalization' are at the core of many dam removal discussions.

I do so through a close examination of dam removal debates in Spain and the discussions around the Los Toranes Dam as a case in point. Spain has historically been shaped by a hydraulic mission to use every drop of water productively and as a result has one of the world's highest numbers of dams per capita (Swyngedouw, 2015). At the same time, there is now a growing civil society mobilization that calls for a new water culture and a rethinking of Spanish water policy (Hernández-Mora et al., 2015). One aspect of this counter current is the proposal to remove dams and other barriers in rivers to restore river connectivity. However, many of the proposed dam removals are fiercely contested by local populations, municipalities or employees of the river basin authorities themselves.[52]

[52] It should be noted that even though I focus on discussions and contestations surrounding dam removal, there are also cases where dam removal is actively promoted by local initiatives. An interesting example is the association A Rente Do Chan-Pladever that has been mobilizing for the removal of the Ponte Inferno Dam in Galicia because of its detrimental ecological effects (Dam Removal Europe, 2018).

6.2 Dam removal, the temporalities of infrastructure and performative imaginaries

Since its accelerating promotion from the 1990s onwards, dam removal has been studied from different perspectives. Many studies focus on the United States – forerunner in this subject – even though studies on European cases are growing in numbers as well. Studies from other geographical areas are scarce with exceptions such as Chowdhury's work (2013) on dam decommissioning in India and Hatsuko's (2004) on Japan's first dam removal. Part of these studies emphasizes the physical and ecological responses to dam removal (Bellmore et al., 2019; Foley et al., 2017), while the other is concerned with the governance processes and discussions accompanying removal projects.

In social sciences and political ecology studies, European dam removal has received relatively limited attention. A noteworthy exception and important contribution has been a special issue published in *Water Alternatives*, which analyses case studies from the US, Canada, France and Catalonia. The general conclusion (which has also been confirmed by practitioners interviewed during this research) is that "the removal of water infrastructure is often lengthy, institutionally complex, and characterized by social conflict" (Sneddon et al., 2017: 648). Reasons for social conflict include the different values attached to a dam and the dammed and undammed landscape (Brewitt, 2019; Fox et al., 2016), debates about what is natural and what is not (Jørgensen, 2017), and the process through which dam removal is promoted, wherein blueprint ideas about ecologically valuable dam removal proposed by outside actors in local territories cause resentments among affected populations (Brewitt, 2019; Germaine & Lespez, 2017). Yet another aspect that is highlighted for example by Druschke et al. (2017) and Germaine and Lespez (2017) is the role of fish in dam removal, providing a motivation and argument especially for removal proponents who put themselves forward as spokespersons for these mute, nonhuman actants. Concerning dam removal in Spain, the study of Brummer et al. (2017) stands out in which they analyse fierce local opposition against two dam removals in Catalonia because of cultural, recreational and aesthetical values associated with the existing infrastructures.

The mentioned studies have helped to place dam removal on the academic as well as policy agenda to a certain degree, and showed some of the diverse ecological and socio-political implications and complications dam removal brings along. However, critical analysis of the politics and broader societal questions opened up by dam

removal debates is limited. For example, how dam removal relates to the modern imaginaries and ideologies inherent in traditional 20th century dam building and how it links to wider societal changes remains unexplored. At the same time, dam removal has not been brought into conversation with scholarly debates on the temporalities of infrastructure, despite temporality being a central element in the emergence and discussions of dam removal and vice versa, ruin and removal being an important, last temporality.

In infrastructural studies beyond the water realm, temporalities have received more explicit attention, originating from a criticism on earlier scholarship in which infrastructure – be it dams, pipes or roads – were considered as technical political projects that start with a certain idea and ideology and end with its building into the landscape. In the volume *The Promise of Infrastructure* edited by Anand, Gupta and Appel (2018), for example, a whole section is devoted to temporality. The authors argue that infrastructure needs to be conceptualized as "a process over time" and as "unfolding over many different moments with uneven temporalities" (Anand, Gupta & Appel, 2018: 17). They attribute these temporalities and changes in infrastructure amongst others to the decay and deterioration of construction materials so that the last stage of an infrastructure's life is 'ruin'. In a similar vein but also connected to broader discussions about white elephant investments, Carse and Kneas (2019: 9) even content that "planned, blocked, delayed, or abandoned […] projects are […] the norm, rather than the exception" (cf. Therkildsen, 1988; Veebel et al., 2018). They suggest that studying these diverse forms and stages of infrastructure (or of 'infrastructure lives', to stay with this dissertation's terminology) sheds light on the myriad ways in which finished or unfinished infrastructure makes, re-makes and maintains relationships, aspirations and identities (Gupta, 2018).

Such notion of uneven and multiple temporalities connects to the calls of anthropologists for a conceptualization of infrastructure as always in the making, with often unintended and unexpected outcomes (Harvey & Knox, 2015; Jensen & Morita, 2017). This means that, if we want to fully understand infrastructure, we need to 'follow it' throughout its life and scrutinize how it emerges in temporally situated contexts, as a product of multiple histories (Barry, 2015). As I show in this chapter, the entwinement between infrastructure and the broader socio-political and material context is not only important for understanding where infrastructure comes from, but also to understand how it transforms during its existence and how it comes to be challenged to the point of removal.

In this conceptual context, dam removal is a unique instance where removal of obsolete as well as functioning water infrastructure is actively promoted. It is in most cases not the consequence of abandonment because of drying up funds or the like as analysed by other scholars, but it comes forth from material, technical, socio-political and legal shifts in the networks that spin around riverine water structures. At the same time, discussions surrounding dam removal shed light on the transformations an infrastructure and its human and nonhuman surroundings go through during its being and becoming, which make 'the end of infrastructure' a fiercely contested matter. Dams acquire meanings, change practices, influence subjectivities and reconfigure place-based identities much beyond their original design, which then challenges the technically-determined 'life expectancy'. In this sense, dam removal can advance (and challenge) our thinking about infrastructure, its temporalities and specifically the process of aging – materially and ideologically.

In the different momentums of infrastructure, aspirations and promises play a central role. As Harvey and Knox (2012), Hommes and Boelens (2017) and Oliver (2000) for example have shown, infrastructure projects originate from specific imaginaries about what is and what should be: socially and politically but also importantly technologically and materially (Jasanoff & Kim, 2015). Infrastructure and territorialisation projects originate from particular imaginaries and vice versa, infrastructure acts as powerful tool to materialize imaginaries. In 'classic' dam building efforts, especially modern imaginaries were central that were characterized by the aspiration to break away from a savage past, dominate unruly nature through human's technical ability and rationally design the social and environmental spheres (Hommes & Boelens, 2018; Kaika, 2006; Scott, 1998). Importantly, modern imaginaries associated with infrastructure projects implied a linear time understanding: away from a savage past, towards a future full of progress and modern development (Appel, 2018).

In contrast to scholars who have used the notion of imaginaries mainly to scrutinize the origin of infrastructure projects, I argue that they also remain important throughout post-construction infrastructural life. I show how imaginaries are, in fact, at the core of discussions surrounding dam removal: imaginaries about what was (What and how was the river before dam construction?), what is (What is the river? What is nature? What is the dam?) and what will and should be (What should the future in terms of socionatural relations look like? What could the river or the dam be in the future?). As the past and the future are necessarily always partially imaginary and constructed and therefore differ between actors, many contestations evolve around these temporal dimensions

of infrastructure. In the present, the past and the future of a river or a dam become manifested through narratives, through giving meaning to past and current practices and through structuring actions, decision-making and actor alliances (Jasanoff & Kim, 2015; Oomen et al., 2021). As Oomen et al. (2021: 1, parentheses added) put it: "Imagined futures [and pasts] become socially performative".

6.3 Dam removal in Spain: Drivers and discussions about infrastructural ruin

6.3.1 Shifting dam networks

Spain is well-known for its historical hydraulic mission that has been deeply enmeshed with political agendas and that has led to the construction of thousands of dams across the country. However, since the early 2000s there have been increasing efforts to remove especially smaller weirs. By 2020, the Ministry for the Ecological Transition had registered 335 barrier removals, of which 7 are dams higher than 10 meters, 96 weirs between 2 and 5 meters and 160 weirs lower than 2 meters (Magdaleno, 2020). A large share of these projects has been implemented between 2009 and 2012, and then again from 2015 onwards. These fluctuations are associated with changing budgets and shifting political agendas. For example, after the economic crisis in 2008 within the so-called 'Plan E', financing for public works became available to stimulate the Spanish economy; an opportunity that was used by several river basin authorities to implement barrier removal projects that – just like conventional construction works – imply the contracting of national construction companies and are thus believed to contribute to economic recovery.

However, in order to fully understand this trend of barrier removal in a country like Spain, it is important to consider the infrastructure in question – from small weirs to big dams – as embedded in broader networks of interconnected technical, administrative, financial, socio-political and ecological elements. These elements may be relatively stable over a certain period of time, but can change with the years, bringing about a reconsideration and questioning of the meaning and role of infrastructure.

First of all, materials of dams are decaying with time, having as a consequence possible safety concerns (in the case of bigger structures) and increasing maintenance costs or reduced capacity, which in turn leads to a reduced profitability (in the case of dams build for hydropower generation). This can make it unattractive for dam

owners to renew licenses when they expire. However, for many years, in practice many responsible river basin authorities have not done a strict monitoring of this, meaning that licenses might expire without anybody taking action. Being aware of this, one of the organizations actively promoting dam removal called AEMS-Ríos con Vida (*Asociación para el Estudio y Mejora de los Salmónidos* - Association for the Study and Improvement of Salmonids) counts with the support of a lawyer who is by some referred to as 'the lawyer of Spain's rivers' and who is regularly submitting allegations or requests for removal to the responsible agencies. For example, in the first half of 2021, AEMS-Ríos con Vida submitted ten allegations related to the expiration of a water use license and/or removal of a barrier (AEMS-Ríos con Vida, no date). This means that an environmental organization interested in ecologically healthy rivers appeared on the scene and is now putting the focus on expiring licenses, especially in ecologically valuable areas.

This attention is especially relevant for barriers that are still currently in officially registered and acknowledged use. However, as has been mentioned above, many removal projects in Spain are removals of old weirs, which often do not have any official owner any more. In these cases, the removal is driven not so much by expiring licenses but rather by practical considerations of water agencies that prioritize removal projects that are socially little problematic (for example structures in largely uninhabited areas), ecologically valuable (for example close to the river mouth, in natural areas or migratory fish habitats) or can be framed as important for preventing security risks associated with old structures. Structures that fulfil these criteria have been present in Spain for longer than their removal has been promoted. Yet, only with other changes in the dam-related networks and relations, dam removal has become an imaginable possibility and a future that can be acted upon.

In this context, it is also important to understand that barrier removal in Spain is embedded in a broader policy context with two crucial developments: a call for a new water culture that departs from the conventional hydraulic paradigm, promoted by a coalition of activists, academics and water managers since the 1990s (Bukowski, 2017); and the European Union and the translation of its water and biodiversity related policies onto the Spanish territory (Martínez-Fernández et al., 2020).

The call for a new water culture, institutionalized in the 2002 established *Fundación Nueva Cultura del Agua* (New Water Culture Foundation, in the following FNCA), has been successful in opening up discussion about the long dominating hydraulic paradigm that has favoured large-scale hydraulic works and other supply-side oriented investments.

They have managed to question interbasin water transfers as well as the widely promoted irrigation modernization, and brought topics such as ecological base flows to the agenda. In that sense, the new water culture can be seen as a result of, and in turn reinforcing, a change in how hydraulic infrastructure, rivers and nature-society relations are imagined. This paves the way for, and is strongly connected to, the promotion of dam removal.

The second important policy-related shift is the European Union and particularly its 2006 Water Framework Directive (WFD) and the recently published Biodiversity Strategy. The Directive's importance for barrier removal is threefold: First, it opened up space for more participatory and transparent decision-making, making the sphere of water management and policies that had long been dominated by an elite of civil engineers accessible to new actors and civil society (Hernández-Mora et al., 2015). This provides opportunities, for example for environmental organizations, to comment on the river basin authorities' five-yearly planning and participate in public water-related debates. Second, barrier removal is by its advocates promoted as an outstandingly cost-efficient measure for achieving good (or at least better) ecological status of rivers as mandated by the WFD. Gonzalez del Tanago et al. (2012), for example, mention that it was the WFD's environmental objectives that motivated the then Ministry of the Environment (nowadays Ministry for the Ecological Transition) to initiate the National Strategy for River Restoration in 2006. The European Union's Directive thus provides a clear justification for river restoration on the policy level, and barrier removal becomes a technical tool to reach national and European objectives. However, it should be clarified that the European policies – while potentially powerful – do not 'do the job alone', meaning that while they are in theory equally valid across Spain, their interpretation and implementation strongly varies. Political agendas and the willingness to implement is as crucial.

Likewise, EU policies can be contradictory and contested. For example, hydropower as a source of supposedly green energy is promoted in parallel to the restoration of river connectivity. Also, an adherence or reference to EU policies is contested when translated to local contexts. Amongst people and initiatives that have defended dams or weirs against removal, the blueprint nature of EU policies is a common criticism: "When the WFD came out, the river basin authorities made plans to improve the status of the rivers. […] They considered that dams are part of the problem because they interrupt rivers. Then they said that you have to remove all of them, without selecting which ones to remove and which ones not".[53]

[53] Interview Association for the Conservation and Study of Mills – ACEM, 12.08.2020; emphasis added

In conclusion, dam removal has been made possible by shifts in the networks surrounding dams and other river barriers, composed of materials, policies, institutions, people, and imaginaries. Not only infrastructure construction but also its removal is a product of multiple histories. Beyond being a 'logical' step resulting from material decay – the last step in infrastructural time –, it is also a socio-political choice made possible part by the actual material ageing of infrastructure, part by social and political developments. In particular also an ageing and 'ruin' of earlier imaginaries associated with dams and new ideas about the position of humans in nature are central. Not the domination of nature through humans and technology is seen as desirable anymore, but the liberation of nature from historic human domination for the sake of future biodiversity, human and ecosystem health.

6.3.2 Contested dam removal and river imaginaries

As mentioned, Spain has long been shaped by a hydraulic paradigm, dominated by massive state-led infrastructure projects aimed at making sure that no water would ever be 'lost to the sea' (Lopez-Gunn, 2009; Sauri & del Moral, 2001; Swyngedouw, 2015). Even though some scholars already see the "end of the hydraulic age" (Sauri & del Moral, 2001: 351) or a "transition" away from the hydraulic paradigm (Martínez-Fernández et al., 2020: 556), when analysing barrier removal many of the interviewed actors state that the old hydraulic paradigm is still present and influential. Social opposition, from local populations or also from within the state's water institutions is often attributed to the idea that dams are monuments, there to stay forever, the representation of engineering grandeur: "[Infrastructural] works are considered a heritage. They are considered something to keep, not to remove. They are considered a source of wealth and power […]. This is the approach that still prevails today. […] Questioning a hydraulic work still does not enter the minds of many today".[54]

Linked to this worshiping of dams is an idea of nature as a resource to be harnessed for productive purposes, and of rivers to be canals that convey water from one place to the other. Such conception is not unique to Spain but has for much time been at the base of many modern hydraulic projects. A central role in this modern thinking play engineers as those with the skills and ideas to make dreams of canalized, dammed and thus 'productive' rivers come true (see also my analyses in Chapter 4 and 5). Also in Spain, the river basin authorities have been traditionally dominated by civil engineers who are dedicated to technical-productive water management that focuses

[54] Interview AEMS-Rios con Vida, 16.07.2020

on dam building, river canalization, or – more recently – irrigation technification. Dam proponents see this long tradition of civil engineering culture as a major hindrance for a true paradigm shift towards a new water culture: "They do not want to [remove dams] because there is an insistence on reservoir construction that is inherited from parents to children since the beginning of the 20th century. If you are asking for the demolition of an infrastructure, you are acknowledging a failure of a work of your grandfather or your father or someone you know".[55] Dams are thus deeply enmeshed with specific individual as well as group subjectivities, and dam removal potentially becomes a personal assault – on a person, on a tradition, on a long-hold belief system. However, it seems that the river basin organizations are becoming more diverse in terms of professional background and age average, because of retirement but also because of increasing interest to have more interdisciplinary teams. Many of those promoting dam removal are biologist or forestall engineers, or have superiors with these backgrounds. This change in professions is perceived as key to making dam removal and river restoration imaginable: "Incorporating [biologists] into a basin organization that is traditionally dominated by civil engineers [led to a] change of mentality and the beginning to interpret, as requested by the Water Framework Directive, rivers as fluvial ecosystems not as mere channels that provide services".[56] If the change in the work force composition at water institutions or rather broader societal calls for a new water culture were first, is hard to establish. Nevertheless, it is important to acknowledge that several nodes of the socio-political networks in which dams are embedded are shifting and shifts are mutually reinforcing each other, so that dam removal becomes a viable possibility.

In this context, some see dam removal as a symbolic act that breaks with earlier dam imaginaries and ideologies: "One of the main objectives of the demolition of dams is to end the myth of the hydraulic works as a subsidized redeemer of hardships that has to remain eternally as a monument" (Brufao, 2006: 14). However, when put into practice it becomes clear that dam removal as symbolic act is not implemented on an empty territory but personally affects those people relating to a dam through livelihoods, everyday practices, memories or subjectivities. In some cases, such as the Toranes Dam, the impression then that the promotion of a dam removal is not so much about one specific dam but rather about 'proving a point' generates local discontent.

[55] Interview Ecologistas en Acción, 14.07.2020
[56] Interview river basin authority, 14.04.2021

Also, ideas about dam removal and its meaning – locally, practically and symbolically – are not homogenous among people and institutions. The idea of dam removal playing a role for shifting encrusted water management paradigms is largely one that exists among environmental NGOs. Those working in the river basin authorities have a more practical point of view: "We are not the champions of demolitions, we are a public body that complies with the law, we do not have a special desire to demolish dams […]. When there is an obstacle that is abandoned, that has no type of use anymore but that has enormous impact, and if it is possible to remove it, we remove it. But we do not promote to remove dams just for the sake of removing dams".[57] In the same manner, the idea of a life cycle of a hydraulic infrastructure with a determined end is often evoked by technicians of the river basin authorities, portraying dam removal as a logical step that eventually needs to be taken. This idea is also included in Spanish laws, which establish that once the use concession associated with an infrastructure expires, the owner of that infrastructure is obliged to demolish the structures at their own expense (Article 101.1 of Law 33/2003 of Patrimony of Public Administrations). In the light of contestations within their own institution and by local communities, alluding to the law and to dam removal as a logical step at the end of an infrastructure's life allows technicians to de-politicize, de-ideologise and technify removal. In a way, it also avoids more substantial questioning of the role of dams in society, as dam removal becomes a last management intervention rather than a proof of dams' failure to meet promises. As one technician puts it, "an engineering work has a life cycle […] [which] means that a work is done to meet certain needs, it fulfils them and when it is no longer useful the river must be returned to its initial state, which is a river without a dam".[58]

This imaginary of the possibility to return to a pre-dam river is contested. One key issue is related to concerns about dam removal potentially aiding the further spreading of undesired invasive species to the detriment of local species. A barrier can thus also be seen as having positive ecological effects in a heavily modified riverine environment that is not the same as it was when the dam or barrier was constructed. The ambition to restore a river is thus far from straightforward (cf. Lévêque, 2020). Moreover, this ecological view of nature where past human intervention can and should be at least partially undone is also criticized by a community of people concerned with cultural and industrial heritage. In their view certain dams and weirs are part of a cultural historic landscape, witnesses of history and past developments (Izaga Reiner &

[57] Interview river basin authority, 14.04.202
[58] Interview river basin authority, 03.08.2021

Herreras Moratinos, 2016), and an integral part of a 'new nature'. This is to say that old river infrastructure is at times portrayed as ecologically valuable and are, in fact, seen as no longer separable from nature. As a representative of the cultural department of a regional government in southern Spain explained: "In some cases, the *azud* [59] has been in this place for more than 1000 years. It is true that its construction altered the ecosystem, of course it did, but the ecosystem immediately readapted to the new water circulation patterns. I insist, [the *azudes*] are not a form of industrial water circulation, they are pre-industrial. […] And what they [removal proponents] don't want to see is the ecosystem, the biotopes that have evolved around those structures that have always been there".[60] This view makes a return to the past not only impossible but also undesirable and views rivers, nature and society as part of the same socionature (Swyngedouw, 1996). More so, I would argue that the past is imagined inherently different by those promoting and those refuting dam removal. On the one hand, there is the idea of a past river that has since long been modified by human intervention, adapted to it and thus has become a 'hydrosocial' river – something natural in the anthropogenic epoch rather than something negative. And on the other hand, there is the idea of a river's past as more natural, free-flowing and thus healthier (e.g. in terms of biodiversity and water quality), leading to the call to break away from past dam building and river domestication and return to the virgin past. In that sense, how the river's past and thus also its future is imagined is based on particular imaginaries that do not so much reflect a 'singular true past' but rather a current social, cultural and political positioning (cf. Perrault, 2018).

Ideas about the riverine and infrastructural past are reflected in language. Whereas 'barrier' (a term common among removal promoters) is a purely technical term, which moreover has a negative connotation as it implies the impediment of something; terms such as *azud* hint to a cultural component. As the above cited regional government representative analyses: "I have come to see many projects that do not speak of *azudes* [...], that is, they do not use the historical name. [...] If you speak of *azudes* then from the outset you acknowledge their age. [Instead, they speak of] transversal barrier. [...] Transversal barrier, that has no character, it does not carry valuing connotations from the cultural point of view. [...] From the outset it is denying patrimony when they

[59] *Azud* is an Arab term commonly used in Spain for weirs. In some cases they are Moorish structures, in other cases they are newer structures situated where Moorish structures previously existed.

[60] Interview representative regional government, 08.07.2020

use that language" (Interview July 2020). Language here inherently mirrors specific imaginaries of barriers/*azudes*/infrastructure, which in turn manifest in removal projects or their objection.

At the core of these discussions are, in fact, diverging ideas about the nature of river structures and, from the point of view of those contesting removal, a criticism on considering river structures as mere technological, non-social artefacts. Such clear distinction between the natural and technical (the river, the dam) and the social (society) reminds of earlier traditional modernist visions of rivers and dam construction. Even though the earlier consider dams as positive and nature as something to be dominated while the latter see dams as harmful and nature as favourable, the purification of and separation between technology, society and nature bears resemblance. This distinction leads to contestations that stem exactly from the sociomaterial and socionatural characteristics of water, water technologies and water territories as I elaborate in the following section.

6.4 Contestations around an ageing dam, nature and the future

6.4.1 The Toranes Dam and the proposal to remove it

The Los Toranes Dam (in the following abbreviated as Toranes Dam) is a 14 meters high and 38 meters long dam in the upper stretches of the Mijares River in the province of Teruel in Eastern Spain (see Figure 16). The Mijares River is a 156 km long river that springs in the mountainous area Sierra de Gúdar at 1600 meters above sea level and drains into the Mediterranean nearby the coastal city Castellón de la Plana. Along its upper course, the river passes through a Natura 2000 zone as well as various dams, the biggest one being the Arenós dam with a storage capacity of 132 hm3. Much smaller, but recently in the focus of attention, is the Toranes Dam that was constructed in 1954 for hydropower use. From the dam, the water is conducted through a 7 km long tunnel to the hydropower plant of Albentosa, which has a production capacity of 11,84 MW and has since 1998 been owned and operated by the Spanish electricity giant Iberdrola (Amoedo Fernández, 2019). After having moved the hydropower turbines, the water returns to the Mijares River. Just above the Albentosa power plant, a small part of the water is diverted to a local irrigation canal called Acequia del Diablo, which can be freely translated as Devil's Canal, that is believed to have its origin in the 12th century Moorish period (Hermosilla Pla, 2011). The canal's original intake was a weir further

upstream which was destroyed by a landslide in 1993. Since then, a new intake from the power plant's turbine has been in use for the irrigation of approximately 48 hectares of small fruit and vegetable orchards in neighbourhoods of the municipalities of San Augustín and Olba (Confederación Hidrográfica del Júcar, 2020). The newly installed intake was never officially approved or recognized by the responsible Júcar river basin authority (Júcar RBA - *Confederación Hidrográfica del Júcar*), but has nevertheless in practice and materially linked the local irrigation system to the hydropower company's infrastructure. This dependency is one of the principal reasons why the proposed removal of the Toranes Dam has sparked fierce local contestations.

The proposal to remove the Toranes Dam emerged when its use license expired after 75 years, leading the Júcar RBA to start the administrative procedures for the declaration of expiration of the water use right in May 2017. In theory, the current owner of the infrastructure Iberdrola would have been able to renew the use right. However, this would have required full compliance with current environmental and water legislation, implying amongst other things the installation of a fish ladder and continuous discharge of legally established environmental flows. These measures implied investment costs and a reduced production capacity because of reduced water flows. This, together with the already by design relatively low production capacity, fluctuating electricity prices and the advanced age of the dam and the power plant, made it little attractive for Iberdrola to prolong the water use right. At the same time, different local and national environmental organizations started to argue for the environmental benefits that an expiration of the rights and the associated dam removal would have.

After the initiation of the expiration procedure, different events took place in which the responsible Júcar RBA, affected municipalities, local citizens, local and national environmental NGOs and other interested parties interacted via official technical reports, written allegations, inspection visits and others. However, it was only in November 2020 that the expiration of the water rights was officially confirmed by the Ministry for the Ecological Transition (who has the ultimate decision-making power in this affair) and that, in December of the same year, Iberdrola opened the gates of the dam and closed off the water intake, which left the Acequia del Diablo without water. This sparked intense local contestations, which before were rather limited and in the background. Diverse actors became involved and mobilized against the proposed removal, such as a local environmental association, the mayor of Olba (who is also the president of a local irrigation committee) and citizens. A platform for affected people called Acequias Vivas (translated as Living Canals) was established that organized actions and developed a website full of stories, testimonies and pictures about the Acequia del Diablo.

Figure 16 The Toranes Dam after the official closure of the water intake (Picture taken by author, May 2021)

6.4.2 The Toranes Dam in transformation: Emerging material and hydrosocial relations

The contestations around the Toranes Dam are related to the co-existing and divergent imaginaries and practices associated with the dam: Toranes as an ecologically harmful barrier and a structure at the end of its lifespan that is connected to EU norms and regulations on biodiversity, making removal appear a logical conclusion and course of action; and Toranes as part of the local natural and socio-political environment where it has acquired meanings and functions that defy a clear end of life and thus refute any straightforward removal.

As mentioned, with the years the dam has become embedded in local activities, most importantly the irrigation of small orchards. This is a result of unforeseen adjustments: a landslide and the subsequently installed alternative water intake established a clear link between nearby neighbourhoods and the fate of the dam. The following poem demonstrates the area's ambiguous relation to the dam, characterized by dependence in parallel to a critical view on past dam building:

"[…] As in the case of the dams of the river, which are not very beautiful.
But, hey, they're done, and with quite a bit of pain.
Is it not better to take advantage of them, if removing them is worse?
The Toranes Dam, which in its time was a horror,
It also brought light to the town, and work and comfort. […]
There are things that we do not choose, they impose them and that's it.
But, if we realize it, should we not avoid it?
Let us take care of our irrigation canals, which others will inherit.
And in this case, the dam, and the canal, and the [hydropower] central,
Well, the Devil's Canal alone will not work."

Excerpt of a poem by a resident of Olba, posted on the Facebook site of the Irrigation Committee Mijares Olba Teruel, 16 March 2021 (my own translation).

So it is not necessarily an approval or defence of the dam per se, but specifically the possibility for irrigation water intake provided by the dam. The Devil's Canal itself has, in turn, become symbol for much more than the irrigation of a limited number of small-scale orchards: a key piece in local history, a place for communal work and interaction, the possibility for attractive living in the valley and thereby a tool for the repopulation of the area (which has been heavily affected by earlier rural to urban migration), sustainable local food supply, a greening lifeline through the area (Acequias Vivas, no date). Accordingly, the slogans on protest banners that are put up in the area along highways, on houses and village squares are centrally equating the defence of the dam to the defence of the irrigation cannals and all of the above-mentioned social, political, cultural and economic concerns (see Figure 17). The protest against the removal of the Toranes Dam has become the defence of local place identity and practices.

In this contestation, the dam removal opponents have managed to attract significant media attention (see for example RTVE, 2021; Sánchez, 2021) and take the issue to higher political levels. Especially after the water intake was closed in early December 2020, regional representatives of all major political parties came to Olba to learn about the discussions. The only party that did not express to be in favour of maintaining the dam was the left-wing party Podemos (Podemos Aragón, 2020). Also the major of Olba and two (out of four) municipal council members pertaining to the PSOE party strongly opposed the removal despite of belonging to the same party that is currently ruling in Madrid and promoting river restoration on national scale. Even within the same political party there seem to exist diverging perspectives between the national and local level when it comes to dam removal.

Figure 17 Banner of protest in the neighbourhood Los Giles reading "YES conserved heritage, living canals, living villages" (Picture taken by author, May 2021)

In the course of the discussions, debates about nature, heritage and the future and present meaning and use of the dam have taken centre stage. On the one hand, there is the idea that a more free-flowing river is more natural and thus valuable. 47 NGOs express it like this in a letter send to the Ministry: "A Mijares River freed from the dam and more naturalized […] will bring wealth and prosperity to the Olba Valley and its surroundings, it will generate green employment, promote environmental education and the dissemination of the values of care and protection of nature, and will put in value one of the most valuable Mediterranean river landscapes" (different environmental organizations, 2021). In this view, nature is the free-flowing river where sediments transport without impediment, where fish migrate, and where the local population enjoys this naturalized riverine environment.

On the other hand, local inhabitants argue that the dam itself and connected canals have created a valuable ecosystem that deserves protection, and that the idea about nature of dam removal proponents is an eco-centric notion detached from the territory: "They refer to the environment from a mechanistic approach, from their offices, missing a holistic and integral vision that also considers people. Destroying the Toranes Dam is damaging this natural, territorial, and social ecosystem in which

we live, it is destroying an organized community… ".[61] Likewise, a representative of the local ecological organization opposing the removal mentioned that "when we talk about the environment we are talking about everything not only about the river but also about the valley and its population, including the human population that lives close to that river, and the balance that we believe exists between people and nature. That is what we try to promote".[62] Parts of the local claims are thus to consider nature as something that inherently includes humans, and thus also human-made environmental interventions such as infrastructure. This imaginary of a socionature then also challenges the promises of ecological benefits of dam removal: "To us [the proposal to remove] seems outrageous. We understand that dams are not good for rivers. If we were talking about building dams, we would all be against it, but no matter how much they want to sugar-coat it and use big and eloquent phrases about liberating the river and recover I don't know what, really what they intend to do is destroy the ecosystem that there is right now with the hope that in a while the river will regenerate an ecosystem similar to the one that existed 100 years ago".[63] This defence of the Toranes Dam in its role to provide a water intake for local irrigation also relates to a widespread criticism on dam removal as a blueprint idea that does not take the local context and local dam usage and meanings sufficiently into account. As mentioned earlier, in its essence there is thus a dispute arising from a technical view on dams and dam removal vis-à-vis lived practices and the dam's embeddedness in the surrounding material, hydrological and socio-political territory.

The dam's new uses and meanings are now well known by all involved actors. However, the new irrigation water intake has never been officially approved by the responsible RBA, which leaves the irrigation community with no actual legal base on which to demand the maintenance of the dam and the intake. The debate is thus also about which use of the dam is officially legitimate and thus to be taken into account. On paper, the license for hydropower generation expired, classifying the dam as 'out of use' and making removal a logical step. In practice, the dam's unforeseen linkage to an irrigation system makes it a functioning infrastructure and questions its technically established lifespan.

[61] Interview Irrigation Community, 13.04.2021
[62] Interview Mijares Vivo, 20.04..2021
[63] Interview Mijares Vivo, 20.04..2021

In the course of the discussions about the removal, the dam also came to be presented as cultural heritage. It might have been largely a strategic move to have an additional argument and legal backing against the removal, but the discussions sparked by the request of the General Director of Cultural Heritage of Aragón on 26 April 2021 to declare the dam, the hydropower plant and the *Acequia del Diablo* inventoried assets of Aragonese cultural heritage are telling in terms of diverging dam imaginaries. In the resolution itself, the infrastructure complex is described as forming part of the "humanized and emotional landscape of the territories of the Mijares River", "identified by the communities […] as an identifying element of their local heritage, as well as a small milestone in the history of the Mijares basin" (Departamento de Educación, Cultura y Deporte, 2021: 23407–23408). On the contrary, the ecological organization AEMS-Ríos con Vida in their response to the resolution remarks that "the Toranes Dam, no matter where you look, is still a vulgar dam of concrete as there are dozens in Aragón, hundreds in Spain and thousands in the world" (AEMS-Ríos con Vida, 2021: 8). Thus, the value in terms of cultural heritage of the dam is disputed as well as the weight this should be given. The process to declare the infrastructures cultural heritage was officially archived a month after its initiation. Nevertheless, the related discussion shows how the dam is strategically framed as an integral part of the socionatural landscape and place-based subjectivities, and how in turn such framing is challenged. Furthermore, it makes explicit how the dam, throughout its existence but also particularly so in the face of a possible removal, acquires multiple meanings and is transformed from a mere tool for local irrigation to a site of local heritage. Similar dynamics in other cases were mentioned during interviews with national practitioners, where the dam in question was for long a rather 'silent artefact' in the background of people's life but put to the foreground when threatened with removal. Socio-political imaginaries and experiences of an infrastructure change over time together with changes in the infrastructure (and linked networks) itself.

In the case of the Toranes Dam, the struggle for its maintenance has also come to be regarded as a struggle for future possibilities in a region that is the least populated of Spain and where Olba is one of the few places that has actually experienced an in-migration in the last years. In this context, the dam, the irrigation canals and the struggle to conserve them has been magnified to being a question about the future of the area. On the website of the platform Living Canals for example, there are multiple references to the future: the central slogan is "Without canals, there is no future: solution now"; the canals are "an essential tool for the existence and development of our region"; "this decision will mark the future of this area of Teruel, and add it to

another uncertain destiny in the Emptied Spain" (Acequias Vivas, no date). The Emptied Spain is a term used to critique the depopulation of rural Spain and the increasing gap in opportunities for rural as opposed to urban areas, blamed on inadequate policies to support rural socio-economic development. In the context of the Toranes Dam, the reference to the Emptied Spain is made to allude to potential possibilities that the dam and irrigation canals could hold for the future of the area from the perspective of removal opponents. The president of the Devil's Canal is cited by the PSOE party to have said: "We are talking about depopulated Spain and this is one more example that contributes to eliminate opportunities to settle down population" (PSOE Aragón, 2020). This connection of the removal to the Emptied Spain has probably contributed to the impressive politicization of the issue. As a local ecologist promoting the removal puts it: "There is a lot of attention for the question of the Emptied Spain, which has been used by demagogic, populist politicians who basically do not care much about water but [instrumentalise] the issue […]. Then in the context of this victimhood that forms part of the Emptied Spain discourse anything is magnified. In this case there are no more than 10, 15, maximum 20 people affected".[64] Wider political relations and discussions about the future of the area are thus enacted through the contestations surrounding the future of the dam. In parallel, the case of the Toranes Dam removal has also been placed in the national debate about the increasing number of aging dams in Spain and how to deal with them (Sánchez, 2021; cf. Marcos, 2021).

What the case of the Toranes Dam removal clearly shows is that the temporalities of a dam do not only include a change in the material constituency of the construction materials, but also changing meanings, users, uses and related subjectivities – all of which have been little envisaged in initial designs. In consequence, the project to remove a dam that is on paper obsolete, no longer cost-efficient nor compatible with environmental goals becomes contested. At the core, similar to dam construction discussions, are questions about what territory should look like, which and importantly whose values and perspectives should be taken into account, how we as humans relate to nature, and what role infrastructure should play in the future of the respective hydrosocial territory.

[64] Interview local ecologist, 15.04.2021

At the time of writing, the demolition project was waiting for a decision of the Superior Court of Justice in Madrid, which has received an appeal from Iberdrola who agrees with passing over dam ownership but rejects to pay for the removal (Sánchez, 2021). In the meanwhile, the dam's water intake remains closed and the irrigation canal dry, and alternative water intake possibilities are studied and debated without a clear solution yet (González Cebollada, 2021; Pérez, 2021).

6.5 Conclusions

In this chapter, I have analysed the discussions triggered by the promotion of dam removal in Spain on national and local level. I have shown how the idea of dam removal comes forth from temporally situated and shifting socio-political, technical, financial and environmental relations associated with dams. In the case of dam removal, 'ruin' does not only refer to material decay but importantly also to the ruin of specific ideologies about dams and rivers, and emerging new imaginaries that manifest in actions and policies directed towards dam removal.

As I have argued, some of the aspects of dam removal, such as for example the idea to return to a nature with lesser human intervention, are not new. Indeed, dam removal comes as part of a long sequence of political-historical and philosophical debates that shape societal perspectives, discourses and actions related to nature and nature-society relations. However, the idea of removing and undoing a dam's impact is contested: because ecological and hydrological conditions have changed or because subjectivities and place-based identities have transformed. Where no population is near, removals are normally implemented without any major hindrances or discussions; whereas contestations are common in places where the dam is embedded in everyday practices. This shows once again how dams are not technical, inanimate artefacts but of a sociotechnical nature. Dam removal initiatives, however, commonly imagine dams and their removal as a technical matter and have therefore been surprised by social contestations that claim dams to be part of local culture, history and water flows. In that sense, an analysis of dam removal exemplifies how academic debates on the co-production of society and nature – or socionature – play out in concrete, on-the-ground dilemmas.

The analysis of dam removal also highlighted the centrality of temporalities in hydraulic infrastructure. From initial conception to final removal (and possibly even

beyond), hydraulic infrastructures such as dams pass through different momentums and contain diverse temporal dimensions. Against the backdrop of material stability, what a dam is and can be (for example in terms of uses and users) can change with time. The end of a dam's lifespan is then not a mere technical figure or decision but a political and potentially contested one. In arising contestations, temporalities and specifically imaginaries of the past and the future are mobilized. In the Toranes Dam case, for example, removal opponents emphasize the future possibilities a dam potentially holds, whereas removal proponents stress the necessity to re-naturalize rivers based on the idea of a past characterized by unspoiled and healthy rivers. A certain imaginary of the past is thus mobilized to shape the future in the here and now. In that sense, considering the temporalities of past, present and future through the lens of imaginaries helps to understand how temporalities relate to political and ontological positions, and how they can therefore differ among people.

Furthermore, this chapter has shown that there is a need for water governance scholarship to consider ruin of hydraulic infrastructures and of related imaginaries as an integral part of infrastructural life. In other fields such as for example urban housing, removal and renewal of infrastructure is actually an ordinary practice and commonly associated with modernization. The case of hydraulic infrastructure is unique in that sense because so far, it was construction that was considered modern and that has attracted scholarly and political attention, while deliberate removal appeared as an innovative – if not revolutionary – idea.

Coming myself from a tradition of scholars that has focused on debates and effects associated with dam building, it is fascinating to relate dam removal to dam construction. As analysed, some advocates see dam removal as a direct criticism on dam construction and a proof of the negative implications dams can potentially have (even though they do not reject all dams per se). Their connection of the pre-dam past with the future reminds of earlier anti-dam movements who mobilized pre-modern water technologies and practices as a desirable alternative to dam construction (cf. Shah, 2012). At the same time, whereas the future promised by modern dam building was traditionally one of linear progress thinking, suggesting a move away from backwardness towards modernity, development and progress; the future promised by dam removal seems to be the opposite as it envisages a return to an imagined past void of infrastructure. It suggests a circular rather than linear time and outlook.

Simultaneously, there are certain parallels between dam building and dam removal efforts. Both suggest a rupture with the past and moving towards something better, which might at first spark local protests but which in the end contributes to a bigger, common goal. Previously, the goal was modernity and development to be achieved through the domestication and utilization of nature with dams; nowadays it is sustainability and re-naturalisation to be achieved with the removal of old dams. Furthermore, as this chapter has shown, both dam building and dam removal are implicitly or explicitly based on a separation (and thus also purification) of the social from the natural world.

In its ambition to rethink water governance and hydrosocial relations, dam removal relates to other alternative water governance approaches that are increasingly promoted around the world, such as the rights of rivers or rewilding movements, just to name two out of many. At the same time, on-the-ground reality in terms of changing ideas about hydrosocial relations and the role hydraulic infrastructure should play or not in the future is messy and there is no singular, clear consensus. In Spain, sometimes both dam construction and removal are promoted in parallel by the same institution. It is thus not a homogenous trend, nor a clear paradigm shift but points to the messiness of water governance and a 'state of bargaining' between opposing paradigms. In any case, dam removal is likely to stay with us for the years to come. Recent reports have adverted about a "mass ageing" of dams that is to become an "emerging global development issue" (Perera et al., 2021: 4) – thus an interesting and highly relevant opportunity for water governance and infrastructure scholars to explore.

Erst wenn uns diese neue moralische Aktion:
der, Blick in den Busen der Apparate' (…)
geläufig geworden ist, werden wir mit dem Recht darauf
hoffen dürfen, dass wir, die wir die Entscheidung über
unser Sein oder Nichtsein in der Hand halten,
auch unser Sein in der Hand behalten werden.

Only when this new moral action: the 'look into the bosom
of the devices' (...) has become common, we shall have
every right to hope that we, who hold the decision of our
Being or Not-being in our hands,
will also keep our Being in our hands.

Günther Anders in his correspondence with
Hiroshima pilot Eatherly (1961)
published in Anders (1984: 219) (my own translation)

Discussions and conclusions

Discussions and conclusions

I remember the first time that I realized what it means to 'follow the water'. It was a morning in late 2014 during one of my first extended field research stays. I woke up early because Eugenio, a *comunero* (peasant farmer) of the community of Huamantanga in Lima's highlands, had promised to take me along on his irrigation turn. We started walking through fields and along earthen canals, and finally stopped at an intersection where Eugenio moved some stones and soil – to be able to direct the water once it arrived, as he explained. But where was the water? Far and wide, I couldn't see any and started to get impatient and wonder if we were mistaken waiting here. "Listen! The water is coming!" he adverted me after some time, but I still couldn't hear let alone see anything. However, when a flow of water finally came into my sight and to my ear – with force and sound increasing by the second – we started walking and literally following, and being followed by, the water through its path along small agricultural plots. It turned at intersections and divisions that we kept manipulating, always walking a couple of meters before the actual water flow to be able to do so. While walking and moving stones and soil, Eugenio explained to me how he irrigated by neatly entwining and fine-tunning artifacts, ecology, water rights and human skills; how irrigation turns were agreed on in the irrigator's community, how the community organized regular and obligatory communal working days to clean and maintain canals. I slowly started to understand how water and water infrastructure is embedded in and product of particular environments, social relations and institutional arrangements. I also got a first grasp and embodied experience of what it means to follow water and infrastructure in research practice, and how those who follow the water every day are the most knowledgeable teachers.

Like Eugenio's and my movements (in body and in talk) that morning in 2014, this research has been about following visible and not-yet or no-longer visible water flows, about hydrosocial co-production; about relations, ideas, practices and effects of infrastructure and (re)directed water flows. In the foregone chapters, I have analysed the distinct cases of the Ilısu Dam, Lima's drinking water supply and hydropower system, and dam removal debates in Spain. I have analysed how actors try to promote and materialize diverging imaginaries about the shaping of hydrosocial territories through these hydraulic infrastructures, and how this leads to contestations of different kinds. In this chapter now, I want to do five things. First, I discuss the main conceptual insights that emerge from the joint study of the cases. Through the conceptual deliberations, I illustrate how the combined study of different cases helps to think through old and new

questions about territorialization processes, hydraulic infrastructure and imaginaries. Second, I explore the implications of the empirical findings from Turkey, Peru and Spain for water governance, specifically trying to make sense of the phenomenon of dam removal in relation to dam (and other hydraulic infrastructure) construction. Third, I sketch some points for new, future engagement. Fourth, I come back to the reflections concerning my own positionality and its enmeshment with this research, which I started in the introduction of this dissertation. I reflect on the co-evolution between research and researcher; its implications, insights and questions. Lastly, to conclude this dissertation, I give a concise answer to the general research question.

7.1 Reflections on living infrastructure, dynamic hydrosocial territories and temporal imaginaries

In this section, I will conjointly engage with the conceptual notions and the three case studies of this research. The intention is not to provide a comparison of the case studies, but to highlight some of the conceptual insights that arise from their joint study. I start with some notes on infrastructure, followed by reflections related specifically to hydrosocial territories and ending with deliberations on imaginaries.

Infrastructural power: higher goals and changing subjectivities

In each of the cases, a specific hydraulic infrastructure (a large-scale dam in Turkey; a system of canals, reservoirs, transfers and hydropower in Lima; and in-stream river barriers of different shapes and sizes in Spain) has provided the entry point for the research. That means that the initial focus in terms of research questions, data collection and analysis was on these infrastructures: getting to know their materialities (location, height, capacity, ….); discovering their design, construction and discussion histories in archives and newspapers; and getting to know them in detail through pictures, maps, reports and field visits. It soon became clear that each of the studied infrastructure projects fundamentally formed part of broader aspirations, goals and socio-political projects and that I needed to scrutinize precisely this interwovenness of infrastructural materialities and socio-political projects. In the case of the Ilısu Dam, it was national energy independence and cultural-political and military control and domination over Kurdish regions. In Lima, the water transfer and hydropower plants were embedded in efforts to bring modernity in the form of unlimited electricity and water to the city, making the torrents of the Rímac and Santa Eulalia rivers allies through domination by engineering works and, at the same time, also modernize urban and rural populations.

Lastly, in Spain, dam removal forms part of a call to rethink human-nature relations and materialize an ideal of pristine rivers, undoing past wrongs. Thus, this research has shown how hydraulic infrastructure is importantly embedded in broader projects with 'higher goals', which manifest and materialize in territories. Or, the other way around, these broader projects – from national consolidation to modernity, urbanization and eco-politics – are inherently territorial projects that intent to reconfigure human and human-nature relations and interactions through infrastructure.

Hydraulic infrastructure is thus mobilized as a powerful tool to materialize projects and imaginaries, and accordingly transform relations between space, people and materiality. It does so in diverse ways, of which the most obvious one is through the specific material and environmental effects resulting from infrastructure construction or destruction: flooding villages, diverting water flows, channelling or liberating rivers and changing possibilities of physical water access. As a result, the environment itself and the way people live in and with that environment changes. These socio-environmental changes also have important repercussions for people's subjectivities, so the understanding people have of themselves and the relations between and among humans, infrastructure and the environment. In the context of infrastructure projects, subjectivities thus may change through the actual physical-environmental changes (cf. Singh, 2013) but also in more purposeful ways. Hydraulic infrastructure projects such as the ones in southeastern Turkey and Lima are often accompanied by powerful discourses and knowledge systems, that promote specific convenient subjectivities in the various phases of infrastructural design, construction and operation. The active promotion of 'modern citizens' according to project planner's ideas and ideals in both Turkey and Peru are a telling example for this. In Turkey, this led to the negation of the ethnic (Kurdish) make-up of the dam affected populations and thus a de-politicization and devaluation of cultural arguments mobilized by the anti-dam movement. In Lima, it led to some community members understanding themselves and acting as collaborating citizens who welcome projects implemented in the name of national progress and condemn others who do in fact oppose. This is one of the often hidden yet substantial ways in which infrastructure powerfully reconfigures hydrosocial territories: shaping subjects that self-correct their conduct and thereby uphold and enact the dominant hydrosocial relations. These processes that form, or in any case influence, subjectivities represent one of the intimate effects infrastructure can have on the 'order of things' – externally and internally.

At the same time, dominant power relations and imaginaries can be contested and negotiated by different actors, who assume different and at times contradicting subjectivities. In the case of the Toranes Dam, for example, it was precisely the irrigators' subjectivities linked to the dam through a self-constructed water intake that sparked contestations of the removal project. In the process of contestations, different additional subject positions were mobilized to further strengthen the claims: irrigators depending on the dam's water, but also politically disadvantaged inhabitants of the forgotten Emptied Spain, an engaged and pioneering community that contributes to the revival of a depopulated area, contributors to sustainable 'zero kilometre' food production. Subjectivities that emerge in the context of infrastructure projects and territorial transformations are thus not necessarily a matter of subordination but can also be affirming and self-confident.

This relation between infrastructure projects and subjectivities is one that is often little visible yet extremely powerful. In fact, the forms of power that are at play in and through infrastructure are extremely diverse, as has become clear in the empirical chapters. It is also important to realize that infrastructure projects exert their influence over hydrosocial territories and relations already before actual construction (or removal) (cf. Suhardiman & Rigg, 2021): In the case of the Ilısu Dam, for example, the contestations surrounding the dam plans influenced relations and the way the present and future territory was imagined before there was a final decision about the construction, let alone material construction works. In a similar manner, the proposal to remove the Toranes Dam led to a reimagining and reframing of the local environment, community and practices, and the role of the dam in it – again before the actual removal works had started. Thus, territories, relations and subjectivities are reimagined and change in the face of an infrastructural project, no matter if it is construction or removal or mere projection of a potential future project.

Size matters

Having said this, the question comes up if processes of hydrosocial and territorial transformations differ or rather resemble one another in the case of different kinds and sizes of infrastructure. This is a particularly relevant question considering the diversity of infrastructures studied in this research, including mega infrastructures as well as small weirs (and others in between). A simple answer to this question is: yes, size matters. Large-scale projects such as the Ilısu Dam are not only 'large' because of their exact physical size but also importantly because of their embeddedness in far-reaching networks of state bureaucrats, investors, engineers, engineering schools and private

consultancy firms (Boelens, 2021). These networks are powerful and often act far away from local realities, being prone to disregard the cultural and ecological diversity of areas affected by the respective projects. Decision-making is centralized and guided by the financial and political interests of the involved powerful players, knowledge production is made an expert-only matter (Boelens et al., 2019). This results in impacts and dynamics that are characteristic for large-scale infrastructure, such as local water rights dispossessions or, in the case of the Ilısu Dam, the prioritization of large-scale infrastructure over smaller alternatives and standardized designs of resettlement villages inappropriate for local livelihoods.

Moreover, the hydraulic property relations resulting from large-scale as compared to small-scale infrastructure are completely different. The notion of hydraulic property refers to the ownership relations and practices that are created through financial, labour or other investments in the building, operation and maintenance of hydraulic infrastructure (Achterhuis et al., 2010; Boelens & Vos, 2014; Coward, 1986). In the cases of the Ilısu Dam and the infrastructure system in Lima, where construction was led respectively by international consortia and a politically and financially powerful urban drinking water utility, the water behind the dam or in the canals is now seen as the property of those who constructed and currently manage the system. As mentioned in Chapter 5, an engineer of SEDAPAL told me: "We own and administer the water as long as it flows in one of our canals".[65] At the same time, in Peru water is officially a public good. This points to the ways in which the construction and maintenance responsibilities for hydraulic infrastructure – which are directly related to the size and the design of the infrastructure – create new *property relations of practice* that not always coincide with official written state law, leading to legal pluralism. In the case of the Toranes Dam, discussions are not so much about the dam in the first place, but rather about the water intake that was constructed 'spontaneously' by local irrigators years after the initial dam construction, when the original irrigation water intake and conveyance canal were destroyed by a landslide. This additional and unforeseen construction created hydraulic property rights regarding the dam's water for the local irrigation community – not in officially registered form but in practices, relations and ideas. Accordingly, when the project of the removal of the Toranes Dam arose, irrigators were not considered as official proprietors but mobilized because of their created and practiced hydraulic property rights. Such improvised local hydraulic property and the

[65] Interview representative SEDAPAL, 17.08.2015

defence thereof would have likely been impossible in the case of a mega-hydraulic dam such as the Ilısu Dam.

At the same time, the case of Lima's infrastructure system asks for a revision of the definition of 'large-scale'. When is a dam or a hydropower plant or a canal considered large? The International Commission on Large Dams says that a large dam is a "dam with a height of 15 metres or greater from lowest foundation to crest or a dam between 5 metres and 15 metres impounding more than 3 million cubic metres" (Constitution Statuts, 2011: 3), whereas large hydropower plants are usually those with an energy production capacity of more than 100 MW (Carrasco & Pain, no date). Under these definitions, most hydropower plants and dams in Lima do not classify as large. However, I would argue that they should be considered large-scale because of their combined operation and existence: their impacts are not minor but conjointly they profoundly reconfigure hydrosocial relations, practices and hydraulic property relations in the region. Moreover, many of the today existing tunnels, canals, dams and hydropower plants were envisaged conjointly in an encompassing 'master plan' for the hydroelectric exploitation of the watersheds, and relied on the mobilization of international capital, engineering expert knowledge, high-level political influence and support, and the un-imagining of local communities' livelihoods, as I elaborate further below. In short: even though the hydraulic infrastructures in Lima's watersheds would not officially classify as 'large' when considered separately, they need to be considered as large in terms of the mechanisms and power relations that created, operate and maintain them, as well as in terms of their impacts. This also means that studies of hydraulic infrastructure need to be attentive to scale and the wider infrastructural networks of which one individual infrastructure often forms part to fully grasp its origins, workings and associated territorial transformations. More so, considering that Lima's infrastructural system is not an exception but rather the rule: in many parts of the world territories are permeated by sequences or assemblages of multiple hydraulic infrastructures of diverse shapes and sizes; they are not stand-alone, isolated artefacts (see for example Belletti et al., 2020).

Hydrosocial territories and infrastructure lives: between stability and dynamism

Scale is also important when studying infrastructure in terms of the webs of multi-scalar relations that spin around and co-produce infrastructure. This dissertation has shown that in order to understand hydraulic infrastructure – its origins and effects – it is imperative to understand it in its multi-scalar, multi-relational embeddedness in territories. Here, the notion of hydrosocial territories has proved particularly helpful.

It has allowed me to see the different components of hydraulic infrastructure projects – from spaces and materialities to discourses and imaginaries – as interacting 'layers' or 'nodes' that co-define relations and practices, and together form territories. In comparison to similar concepts such as for example 'waterscape' (Karpouzoglou & Vij, 2017; Perreault et al., 2012; Swyngedouw, 1999), the concept of hydrosocial territories pays particular attention to the dynamic and contested nature of territories, the diverse power dynamics shaping and contesting territorialization processes in and through hydraulic infrastructure, including ontological and cultural politics as well as 'governmentalities'; and the possibility of simultaneously overlapping hydrosocial territorialities (cf. Swyngedouw & Boelens, 2018). Moreover, this analytical perspective together with the empirical details of the three case studies has demonstrated how outcomes of infrastructure and territorial projects are not always as intended and can dynamically change with time. In other words, hydraulic infrastructure and the related hydrosocial territories swing between material stability and dynamic response.

Concerning the unintended and 'spontaneous' outcomes, the dam removal debates have been particularly insightful. As mentioned, many dams in dam removal debates are not the same ones anymore as when they were originally planned and constructed. Users, uses, embeddedness in local landscapes and identities, as well as meanings attached to an infrastructure are not set in stone. In other words, what a dam (or other hydraulic infrastructure) was, is and can be changes with time and is imagined differently by different actors. In the case of the Toranes Dam, this has led to clashes surrounding the dam removal proposal. Another example of unintended and unforeseen outcomes and transformations are the recent developments in Lima. When I participated in 2018 in the annual water celebration of the community of San Pedro de Casta in the sub watershed Santa Eulalia, one of the community leaders declared that the community was the caretaker of water supply for Lima and thus had a special responsibility to protect water sources from deforestation, overgrazing and other pressures and to continue or revive traditional practices of 'sowing and harvesting' water (in Peru widely known as *siembra y cosecha del agua*). This is a discourse often circulated and stimulated by NGOs trying to implement Payment for Ecosystem Services or green infrastructure projects for shared benefits between Lima and rural communities. While some community members welcome these projects (such as the speaker at the water celebration) and hope for future benefits, others see them as an encroachment of Lima's influence. They become increasingly aware of their own spatial closeness to the capital city and worry about possible future competition for water resources, in which Lima's water use is likely to have the upper hand. They start to question how highland

reservoirs are managed and how hydropower companies acquired control over them. They start to renegotiate the past. The original intentions of NGO projects (to mould conforming water caretakers) thus miss the target.

For this reason, the sub title of this dissertation is "water, territories and transformations" rather than "water, territories and outcomes". It points to the co-existing territorial and infrastructural stability (with certain more or less stable climatic and environmental conditions and concrete infrastructure components) and dynamism (cf. Bennett, 2010). The lens of hydrosocial territories allows to grasp these diverse, interrelated changes in the networks and patterns of hydrosocial relations and ideas. It opens the analytical gaze to consider the embeddedness of infrastructure and map how each of the nodes that constitute hydrosocial territories has the potential to trigger change and reconfigurations. And the other way around, research on hydraulic infrastructure is an excellent entry point to grasp the dynamic/stable nature of hydrosocial territories as this is where all comes together in materialities and practices: politics, epistemologies, designers and users, power relations, environmental conditions and implications.

As all of the above intersect in an infrastructure in different constellations at different moments of time, water governance scholars and in particular those studying infrastructures can actually benefit from rethinking hydraulic infrastructures as 'living'. As Joniak-Lüthi (2019: 6) remarks, "it is thinking through infrastructures as specific bundles of relationships that accumulate over time and thus make each infrastructure embody a different thing at any given moment that facilitates their understanding as inherently lively".

Of course, territories are also materially and political-discursively reconfigured through other types of infrastructure. For example, Baletti (2012) and Harvey and Knox (2015) have shown how road construction has far-reaching impacts for territorial relations in terms of physical spaces, power relations, aspirations and possible or impossible courses of action. In a similar vein, Bouzarovski et al. (2015) demonstrate how gas transmission infrastructure in Europe creates new forms of cross-border territorialities through regulatory practices and spatial features; Suhardiman et al. (2021) analyse how the Lao-China Railway project and connected land compensation procedures serve to expand the power of the central government; and Lesutis (2021) looks at railway infrastructures in Kenya and how they have been central for historic and contemporary state efforts to order and organise space. However, hydraulic infrastructure provides a particularly interesting lens. First, water's indispensability to human and nonhuman

life makes it a particularly powerful tool for realizing ideas and political projects, but also a subject of contention. Second, through its flows and transformability, water connects people and environments in ways no other resource does, making it in a way an 'incarnation' of the idea of territories as networks of relations: just as relations, water connects and forms and is formed.

Imaginaries as cognitive interpretations, strategic tools and aspirations

Imaginaries play a central role in the construction or removal of hydraulic infrastructure and related hydrosocial territories. In the beginning of this dissertation I have defined imaginaries as *societally and institutionally established visions about what is and what ought to be*. I now want to come back to this initial definition and link it to the empirical insights of the previous chapters.

The cases in Turkey, Peru and Spain have all shown the power of imaginaries to act in three principal ways. First, rather than being forward-looking only, imaginaries are also importantly interpretations of the here and now as well as the past. They are the visions of individuals or groups about what a specific hydraulic infrastructure and adjacent territories have been in the past and are in the present. These perspectives can be shared, overlapping, contradicting or conflicting. For example, some local inhabitants envision the Toranes Dam as a tool for ensuring local small-scale horticulture and, with it, sustaining a previously depopulated area. Environmental organizations, on the other hand, see Toranes as a mere "vulgar concrete dam as there are by dozens" (AEMS-Ríos con Vida, 2021: 8) or – evaluating it in technical language of cost-efficiency – as "a hydroelectric facility built in 1954 with very little energy production" (Different environmental organizations, 2021: 1). In a similar manner, the Ilısu Dam in Turkey was imagined by Kurdish organizations and parts of the Kurdish population as yet another intrusion and attempt to exert control of the Turkish state on Kurdish territory; whereas the environmental organizations saw the dam first and foremost in terms of its expected detrimental environmental effects and as one of many local expressions of a wider, worldwide rush on dam construction. The diverging imaginaries of what an infrastructure is originate in people's or groups' respective interests, positions and subjectivities; and in turn have effects for their actions and engagement with the infrastructure.

The way I described imaginaries as interpretations of what was and what is, reminds of what other scholars have termed cognitive framing (Brummans et al., 2008). It is, however, important to mention that while imaginaries can also be cognitive frames

for seeing and interpreting the world, they are often highly political in the context of hydraulic infrastructure and can accordingly be mobilized strategically. This is the second aspect of imaginaries that has emerged from this dissertation: imaginaries as strategic tools to mobilize action and create political leverage. This is to say that the promotion of certain imaginaries about what is and what could and should be is a powerful way to realize infrastructural projects (and the wider aspirations connected to it, such as modernity or wilderness). In the analysis of historic hydropower plant construction in Lima, for example, I have shown how the Rímac and Mantaro watersheds have been imagined in terms of a natural disequilibrium between abundant, untapped water resources on the Atlantic site of the Andes and industrialization and urbanization on the Pacific desert coast, turning the Andes themselves into natural barriers that needed to be overcome through water transfer projects – engineering to re-establish a balance. This imaginary went together with portraying urbanization and industrialization as modern and thus desirable, in contrast to supposedly 'backward' villages still being – literally – in the dark. These imaginaries were extremely powerful, being the seed for the hydropower plant and water transfer construction plans and, in a later stage, providing a justification, mobilizing support and stalling any objections. In this case, imaginaries were different things at the same time: a cognitive understanding and interpretation of the existing reality, as well as a tool that was strategically mobilized to realize envisioned projects.

At the same time, imaginaries also need to be understood as aspirations, as ideas about desirable futures. This is very much in line with Jasanoff's definition I have provided at the beginning of this dissertation (Jasanoff, 2015a; see Chapter 1). In this thesis, the imaginaries in the sense of aspirations are about the design and content of hydraulic infrastructure (what infrastructure needs to be designed and how, to be used by whom, etc.) but also importantly about the broader socio-political and socionatural relations (what kind of society and society-nature relations are desirable and how can this be achieved). They originate from what is imagined to exist, such as the disequilibrium in Lima described above, but also what is aspired, such as modernity, urbanization, industrialization, national energy independence, ecological sustainability, and so on. The three forms or functions of imaginaries ((i) interpretations of what was and is, (ii) strategic tools to mobilize actions, (iii) aspirations) are not clear cut but overlap and exist simultaneously.

Temporal imaginaries: about the past, present and future

A common theme or subject in these different imaginaries that has emerged from the

case studies is time, or rather temporalities. In the form of different temporalities of infrastructure; historic and evolving imaginaries about desirable hydrosocial futures; politically and socially contested memories of the past and imaginaries about the present. Different scholars have analysed the central role of the future in infrastructure construction, with infrastructure holding promises of a better future (Gandy, 2004; Harvey & Knox, 2015; Larkin, 2013; Perreault et al., 2018). As I have outlined above, this is also something that was central in this research. In addition, the study of three different infrastructures and infrastructural moments has allowed to show how aspirations for the future are shifting: modernity, in its 'traditional' form, is not anymore the sole envisioned future but new eco-modernities are on the rise, as I will further discuss in the next section of this chapter. What stood out besides the future and aspirations, was the central role of memory, so ideas about the past. How the past is imagined and portrayed paves the way for how the present is seen and the future envisioned (cf. Perreault, 2018). In Lima for example, hydropower companies as well as some villagers have been portraying the past – without hydropower plants and electricity – as a period devoid of 'progress' and characterized by backwardness. At the same time, the companies' acquisition of control over highland lagoons almost a century ago is now re-imagined and re-remembered in the face of increasing concerns about climate change, sparking questions and contestations. Thus, the present shapes how the past is seen and vice versa, imaginaries about the past and memory act upon present day hydrosocial relations. As Perreault (2018: 230) puts it: "As a representation of the past, memory is always also a representation of the present, and a reflection of contemporary realities, which in turn informs political demands".

As I have shown in Chapter 6, also in the case of dam removal imaginaries about the past are central. Dam removal promotors imagine the past as characterized by pristine nature with limited harmful human interventions. It is a past to which, in the future, we should at least partially return. This view of the past is contested by parts of the local population who argue that hydraulic infrastructures have become embedded in the local culture, social relations and environment and thus cannot and should not be removed. Thus, the past is not merely a concluded, fixed time span but a potentially contested temporality that, furthermore, acts upon the present and the future through imaginaries and infrastructure designs. As with other imaginaries, imaginaries about the past are related to people's and groups' positionality, subjectivity and interests. In consequence, overlapping or diverging imaginaries of times – be it past, present or future – lead to a territorial pluralism in which "different notions of how and what hydrosocial territories are and should be in terms of organization and function, leads to

processes of struggle and negotiation that mould water governance and its outcomes at different scales" (Hoogesteger et al.. 2016: 101-102). With regards to hydraulic infrastructure, imaginaries about the past, present and future thus play an important role in the conception, execution and contestation of infrastructure projects, and contribute to territorial pluralism.

The power of un-imagining and re-imagining

Besides analysing what is imagined and how, it is also important to unpack what is not imagined or even actively un-imagined. Nixon (2010) has insightfully analysed how mega dam projects led by nation states in the global South rely on un-imagining communities and structural inequalities and violence. I believe this is a very important insight and a point to consider in political ecology research about hydraulic infrastructure. Also in this research, communities and socio-environmental realities are un-imagined or re-imagined in ways that fit with the overall project narrative. In the case of Lima, for example, the drinking water company SEDAPAL dedicated a whole book to communities affected by the infrastructure projects and the landscapes where they live, entitled the *Land of the Lagoons* (SEDAPAL, 1998). However, this apparent acknowledgement centres around imaginaries of backward, naive or unruly communities as well as of untapped resources that need to be developed for the common national benefit (cf. Hale, 2002). It thereby denies and essentialises communities complex livelihoods and histories: first through imaginaries, discourses and knowledge creation, and later also materially through the infrastructure projects. This later point has been especially important in the case of the Ilısu Dam, which led to the inundation of historic and culturally and politically important tombs, caves and graves: "Here is being drowned Kurds' equivalent of national archives, national museum, and national library, not to mention their single most important deed to their native land" (Izady, 1996).

In this regard, the case of dam removal in Spain is slightly different: often times, removal promoters imagine the hydraulic infrastructure as a mere technical artefact with pre-defined and static users and uses, then being surprised by people or groups claiming an interest in the infrastructure even though they are not officially registered as users with the responsible water basin authority. This is not an active un-imagining but rather shows how a specific imaginary almost inevitably includes certain aspects and excludes others. Imagining hydraulic infrastructure as a technical, neutral artefact independent from its changing socio-political and environmental context leads to not seeing how an infrastructure's design, use and users might change with time. Even

though James Scott has argued in his famous work *The Art of Not Being Governed* that not being seen can be positive and serve as a protection from detrimental state projects (Scott, 2010), this research has shown how it can also lead to conflicts on the ground when planners or project initiators are confronted with a lived reality different from what they had imagined. There is an important tension between imaginaries and the concerned social and geographical realities (cf. Kaika, 2006). In response, anti-dam and anti-removal mobilizations direct their efforts to visualising non-registered and un-imagined water uses and users, as well as the importance of the respective infrastructure or the negative future impact on their livelihoods. Thus, on the one hand infrastructure project developers and implementers promote convenient imaginaries. On the other hand, counter-mobilizations aim to contest these convenient imaginaries and construct and establish alternative ones. In the next section, I elaborate on how some rather than other imaginaries become performative and materialized, and with what effects for hydrosocial territories.

Performative imaginaries, pervasive power

If there is not *one* hegemonic imaginary that interprets and defines hydrosocial territorial relations but rather a number of overlapping and/or competing imaginaries, the question arises how some imaginaries are carried into effect (for example in hydraulic infrastructure) while others are not. As the case of dam removal has shown, it is often the interplay of different factors and shifts. 30 years ago, dam removal would have been an unthinkable proposal. Nowadays, it is propagated by a growing community of nature lovers, NGOs, practitioners and others because of changing visions on how we should relate to nature, new legislations focusing on ecology, growing disciplinary diversity in water agencies, aging and deteriorating materials of infrastructures and worsening problems associated with river fragmentation. These shifting, networked relations provide fertile ground for imaginaries of river restoration to flourish. This is to say that imaginaries and their effect (or lack thereof) need to be considered in their specific historic, political and environmental context. They are not a stand-alone force.

A key factor for materializing imaginaries are powerful actor alliances. In all cases, especially actors from outside the specific places where the hydraulic infrastructure is or will be situated have played a key role. In Turkey, national and international NGOs, the Kurdish diaspora and international capital have been decisive in pushing forward or pushing against the dam project. In Lima, it was urban demands as well as Swiss engineers that promoted hydropower development whereas members of the affected communities (who regularly commute back and forth between the rural area and Lima)

have recently started to access archives and other resources in Lima to strengthen communities' position. In Spain, nationally-operating NGOs are amongst the fiercest dam removal promotors. Mobilizing actors and a community is thus central for realizing as well as contesting certain imaginaries and associated hydro-territorial projects. Yet, it is not the sheer number of people supporting or contesting a certain imaginary that alone matters.

Rather, imaginaries and their realization are embedded in different forms and relations of power. Which imaginary becomes performative and materialized in infrastructure projects, and thus how territory is ordered, is determined by an interplay of different, overlapping powers. In the case studies there are, on the one hand, always aspects of structural power, which includes the power to access and mobilize financial resources, control political processes and decision-making, and influence the making and enforcement of law. These aspects of 'formal' or 'structural' power are entwined with wider societal relations that organize who has a say and who doesn't along class, gender and ethnic lines. In all of the cases, it is areas or populations that have had limited political participation and attention or, in the case of the Ilısu Dam, that are actually considered a potential threat to the established order (and thus need to be included under the terms of the ruling class). This shows how infrastructure projects are more often than not implemented in already disadvantaged or disregarded zones that are considered dispensable or amenable to be sacrificed for the greater common good. Thereby, infrastructure projects imagine and create 'sacrifice zones' and reproduce already existing larger structural inequalities (Hidalgo-Bastidas & Boelens, 2019b; Lerner, 2012). However, as the Turkish and Peruvian case have shown, it is no longer about the straight-forward exclusion or oblivion of these areas and their socio-political-cultural make-up, but rather about their *inclusion* on the terms of designers and project implementors. New subjectivities, new roles, new water flows, new environments are shaped to align humans and nonhumans in the envisaged 'order of things'.

Thus, there are also subtle yet incredibly potent forms of power at play that interlink with the structural conditions elaborated above. The power to un-imagine or re-imagine is one (see previous section), which in turn relates to the power to define public discourse and opinion, mobilize certain knowledges and disregard others, and establish a 'truth' about the infrastructure project or the area of implementation. In Lima, for example, studies about the unequal distribution of water resources and population between the Pacific coast and the Amazon-draining highland areas are

massively circulated and have become part of the water 'truth' and discourse among Lima's water practitioners and parts of the population (cf. Lynch, 2013). This truth then becomes a powerful justification for transferring water from the as water-rich imagined highlands to the coastal desert city. The mobilization of certain knowledge and the creation of truth is a key aspect and form of power that justifies, and in the following becomes materialized in, infrastructure projects (Boelens et al., 2019). This kind of authority is different from the one officially recognised in laws and state institutions, and can be mobilized by state as well as non-state actors – from NGOs to companies or international cooperation (cf. Suhardiman & Giordano, 2014). At the same time, such truth governmentalities entwine with and mutually reinforce sovereign (and other) governmentalities. An example for this are again the water transfers in Lima, where the scarcity narrative has become legally embedded in a law that gives the right of approving the transfers to the water authority of the basin where water will be consumed (not where water is actually taken from).

In short, power circulates in and through relations between different interest groups, subjects and materialities. It takes different overlapping forms and becomes materialized in hydraulic infrastructure and the associated webs of legal, political, socio-cultural and environmental relations, in turn reorganizing hydrosocial territories. When studying hydraulic infrastructure, territorial transformations and how imaginaries become performative, a differentiated approach is needed that uncovers the manifold forms of power and resulting effects for humans and nonhumans.

7.2 From infrastructure construction to removal: Towards pristine rivers?

After having discussed the conceptual insights and questions raised by this research, the question remains what 'all of this' means for water governance. Especially the study of dam removal has provided an exciting trigger and entry point to question hydraulic infrastructure construction and existence as studied in Turkey and Peru. What are the differences and similarities between hydraulic infrastructure construction and removal? What does this say about future directions for water governance and hydrosocial relations?

At the beginning of this dissertation, I introduced this research as a kind of chronology of imaginaries that evolve from traditional modernity thinking to something else and

new, and of different moments of infrastructural life that begins with conception and construction and ends with decay, ruin and potentially removal. Such framing and reading of the case studies presented in the previous chapters implicitly suggests an evolvement: from infrastructure construction to removal, from ideas to dominate nature through infrastructure to calls for reimagining nature-society relations, liberating nature and thus dreaming of turning back past mistakes. I want to revisit this idea of chronology here and clarify that even though the promotion of dam removal is increasingly hyped, it does not simply replace earlier modern aspirations of dominating nature and thus does not represent a clear paradigm shift.

In fact, dam removal takes place in parallel to dam construction. A recent report of different NGOs contents that "hydropower is booming worldwide" (WWF et al., 2019: 4) and a special issue in the journal of *Water Alternatives* that "large-scale infrastructure development has remained largely unswayed by the 'ecological turn', or the promotion of demand management or 'soft path' thinking, despite a drop in investments observed at the turn of the 20th century" (Crow-Miller et al., 2017: 1). Discourses may have changed – now portraying hydraulic infrastructure as an effective way to mitigate climate change (in the case of hydropower, promoted as green energy) or to deal with adverse climate change effects (in the case of other infrastructure projects for flood control, irrigation, etc.) – but construction in general seems to continue and actually be fuelled by these new discourses (Magilligan et al., 2016).

Even though climate change related discourses have not been at the forefront of justifications for construction of the Ilısu Dam or the water storage and supply system in Lima, the joint study of the three cases has confirmed and is in line with the ascertainment that dam removal and dam construction happen at the same time – at global level but also at local level.

For example, in Spain the River Basin Authority of the Duero River is among dam removal promoters repeatedly mentioned as the forerunner in this topic because they have started removing river barriers before others did, because they have systematized experiences in guidelines, because they are popular speakers at European dam removal events. Yet, in parallel to removing old barriers, new ones are constructed (Confederación Hidrográfica del Duero, 2021). Likewise, the European Union Biodiversity Strategy 2030 calls for restoring 25,000 km of free-flowing rivers while their directives for the promotion of energy from renewable sources considers hydropower and even encourages it through subsidies (CEE Bankwatch Network et

al., 2019). This shows how ideas and water practices are often messy, overlapping, contested and/or contradictory.

Interestingly, though, the question if dam removal represents a paradigm shift, a revolution and evolution or rather the opposite, is answered differently by different people or organizations. For example Roberto Epple, president of the European Rivers Network, is cited by the WWF as describing the recent removal of the Vezins dam in France as a signal of "a revolution in Europe's attitude to its rivers: instead of building new dams, countries are rebuilding healthy rivers and bringing back biodiversity" (WWF, 2019). In a similar vein, social movements from Peru to the Balkans use the fact that dams are removed in some parts of the world to contest dam construction in their own territory, portraying dam removal as the new management approach and dam construction as obsolete and not up to date with current trends and good water management practices (see for example Conservamos por Naturaleza, no date). However, especially practitioners of barrier removal, for example in river basin authorities in Spain, are more reserved and see removal either as a simple instrument to show progress towards improving biodiversity or water quality indicators as required by the European Union or other authorities; or as a logical managerial decision for old, cumbersome structures that could potentially represent security risks. Thus, how dam removal in relation to dam construction is imagined, differs among people and institutions and depends on their different political subjectivities. It does therefore not represent the end of dam and other hydraulic infrastructure construction, even though its potential for new ways of nature-society relations beyond simple nature domestication and domination is undeniable.

Yet, what is interesting to note when having a closer look at the imaginaries and approaches inherit in and promoted by dam removal promoters, is the continuation of the 'conventional' modernist separation between nature and society. As dam and other infrastructure construction associated with modernity, so does dam removal rely on the conceptual and practical separation of nature and society. The promotion of territories with minimized human intervention in rivers aspires to a future where nature is liberated from society, as if nature would be one thing and society another. It is not seen as co-produced. So whereas in Lima, engineers where guided by the idea to dominate and domesticate nature, in dam removal promotions nature is to be liberated from the chains put on it by old, unsustainable policies and water management practices.

In the case of the Toranes Dam in Spain, it is precisely this separation between nature (or rather more broadly the environment) and culture, and the resulting aspiration for a human-void environment, that is highly problematic and contested. The affected irrigation community for example says: "[The organizations promoting the dam removal] refer to the environment from a mechanistic approach, from their offices, missing a holistic and integral vision that also considers people. Destroying the Toranes Dam is damaging this natural, territorial, and social ecosystem in which we live" (Comunidad de Regantes El Mijares de Olba, 2021). The call is thus for considering the environment as being integrated by the relations between humans, material structures and the environment. In such an understanding, nature and territories are co-produced by humans and nonhumans. This is exactly a key aspect that the notion of hydrosocial territories intends to incorporate and grasp.[66]

7.3 Entry points for new engagements

Taking the empirical insights and conceptual deliberations a step further, what can we conclude from this study in terms of political and societal implications? What would it look like in practice if we were to fully consider the intrinsic entwinement of humans and nonhumans, including nature as well as infrastructure amongst others? And also considering other insights of this dissertation: what could they mean in practice?

To be frank, questions about my own proposal (what would *you* do or suggest?) and practical implications have always made me feel most uncomfortable. Especially considering that I took the contested nature of hydrosocial territories as a point of departure made me wonder if there wouldn't always be 'winners' and 'losers' when it comes to infrastructure projects and territorial changes. Maybe this is indeed the case. I nevertheless believe that the ambition should be to reduce injustices in terms of distribution of negative and positive consequences as well as procedures and acknowledgement of diverse actors, practices and imaginaries (Schlosberg, 2004).

[66] This is without falling into the trap of an apolitical Anthropocene, in which an understanding of socionatural coproduction runs danger of opening "the spectre for deepening of a hyper-accelerationist eco-modernist vision in which big science, geo-engineering and big capital can gesture to save both earth and the earthlings" and sustain live and capitalism as we know it (Swyngedouw & Ernstson, 2018: 5).

For this, we first need to engage in what Bowker and Star (1999) have termed 'infrastructural inversion': making infrastructure and infrastructural imaginaries visible, and revealing the power, politics and exclusionary epistemologies involved in infrastructure design, construction, operation, maintenance and removal (cf. Veelen et al., 2021). This then forms the base for a re-politicization of infrastructure projects, making them subject of public discussions and decision-making. As Veelen et al. (2021: 2–3) content, it must be "a democratic struggle for control over the materiality of infrastructure […] [and] also […] a democratic struggle for control over the 'infrastructural imagination'". Political ecology studies about hydraulic infrastructure contribute to this through unravelling dominant discourses, ontologies (what exists and how does it exist) and epistemologies (what do we know and how do we know it); challenging the status quo or what Foucault has called 'normalization' (Foucault, 1975). This in turn opens up spaces for conscientization, societal debate and opportunities to act and counter-act. I hope that this dissertation has made a contribution – albeit humble – to such practice of 'infrastructural inversion' or inspired the readers and other scholars to engage with it.

Resulting from a focus on plural and diverging ideas about hydrosocial relations is also a call to acknowledge and in practice incorporate the diversity of actors, opinions, ontologies, epistemologies and hydrosocial practices that exist on the ground. In concrete terms this means that we – from water users to policy makers, researchers, students, social movements, NGOs and citizens – need to open our eyes and practices to the existing plurality, encouraging diversity rather than standardization and creating spaces for discussing and co-creating hydrosocial futures. This is of course not an easy undertaking and I am aware of the criticism surrounding concepts such as participation or co-creation (Cleaver, 1999; Cooke & Kothari, 2001; Perreault, 2015; Roth et al., 2017; Suhardiman & Geheb, 2021). Nevertheless, I believe we need to 'stay with the trouble' (to borrow Donna Haraway's words, (Haraway, 2016)) and continue inquiring about the different water uses, users, ontologies and epistemologies, and ways to bring them into conversation with each other. This includes moving away from either top-down or bottom-up, to multi-directional (top-down, bottom-up, and horizontal) approaches.

In all cases analysed in this dissertation, a recurring criticism among affected populations was about outside blueprint ideas and 'solutions' that are detached from the actual material places and relations, and that are forcefully imposed upon them. These practices of centralized and place-detached decision-making clearly reflect the often existing unequal power relations between project initiators, national politicians

and designers on the one hand, and affected populations on the other hand. As I discussed in the first part of this chapter, in cases such as the Ilısu Dam exclusionary infrastructural practices form part of a broader disavowal or active un-imagining of local socio-political and environmental realities, or express the prioritisation of the so-called 'greater common good' over local livelihoods. Then again, in cases such as dam removal in Spain, it is the outcome of place-detached and office-based policy and governance processes.

What follows in terms of entry points for new engagements is a need to create space for discussion and engagement between the different relevant scales and actors rather than blueprint 'solutions' or assumptions. Alternative ways and perspectives as well as diverse needs and relations need to take centre stage; the dichotomy and separation between decision-makers and affected populations needs to be overcome. Through opening infrastructure and territorial projects to discussions with multiple stakeholders, rather than leaving design and planning in the hands of techno-political elites and a few chosen technical 'experts', their socio-political nature is acknowledged and given a space. At the same time, in spaces and moments for discussion and engagement there needs to be explicit attention to (potentially unequal) power relations and thereby a re-politicization not only of infrastructures but also of future co-creation and interactive design initiatives. For this, one could draw inspiration from experiences such as transformative co-creation, interactive design of infrastructure, citizen or living labs and park discussion forums, to just name a few (Ballon & Schuurman, 2015; De Souza et al., 2021; Hossain et al., 2019). Even though these experiences have shown that power imbalances remain a tricky issue, optimists believe that process facilitators can use certain techniques to equalize power (Crosby & Bryson, 2005) or that it is a matter of strategic process design, attention, trust and reassurance that all interests are equally taken into account (Bryson et al., 2006; Merill-Sands & Sheridan, 1996). I believe there should be room for dissensus – agreeing to disagree, so to speak. Outcomes from co-creation and engagement processes are uncontrollable and unforeseeable. Neither society nor nature are malleable as often assumed in modernity thinking and modern infrastructure projects. Instead, there should be a reframing from wanting to design and 'govern' water and hydrosocial territories, to engaging in producing spaces, places and conditions for equitable practices and relations to emerge.

Furthermore, the recently amplified calls for multispecies justice (Celermajer et al., 2021) and rights for nature (Kinkaid, 2019) raise the question if and how to involve nature in such approaches. If we consider nature as co-produced, how then could

and should she be included as a subject, an actor? Looking at experiences of rights for nature, and within this realm rights for rivers, makes clear that nature speaks and acts in decision-making or planning processes through human interlocutors. In laws, guardianship committees or other formats explored by rights of nature movements to date, nature is always represented by humans who imagine what nature wants and needs (Kinkaid, 2019; O'Donnell & Talbot-Jones, 2018; Wesche, 2021). They might do so with the help of scientific studies (about the climate, ecological flows, water quality, fish migration or others), spiritual connections or empathy, but it will always be in one way or the other tinted by human methods, senses, emotions and positionality. Having said this, it is maybe not so much be about trying to achieve the participation of a 'pure nature' in co-creation, but rather about focusing on key concerns and adequate spokespersons that ensure the protection and conservation of the environment – this place of rich, uncountable and valuable (for humans but also in itself) interrelations between and among humans and nonhumans (cf. Huijbens, 2021).

In terms of future research, I have three recommendations. First, in order to understand hydraulic infrastructures and the associated territorial reconfigurations it is highly valuable and actually necessary to follow infrastructures and infrastructural imaginaries through time: from their conception to their decay or removal, or throughout whatever path of life they might take. Such biography of infrastructure can yield interesting conceptual and empirical insights on contested and evolving infrastructural relations and effects, opening the famous black box of infrastructure (Pinch, 1992; Winner, 1993) not only once but repeatedly throughout a lifetime.

Second, as mentioned, dam and other hydraulic infrastructure construction continues in parallel to alternative approaches such as dam removal. Besides dam removal, there is also an increasing number of other grass-roots initiatives or new water justice movements that experiment with and propagate alternative, decentralized ways to engage with rivers (Dupuits, 2019; Roa-García, 2017; Villamayor-Tomas & García-López, 2018; Vos et al., 2020). However, these new approaches are little researched and only limitedly taken into account in water policies and practices, despite their possible potential to foster more equitable and sustainable water governance (Boelens, 2020). Therefore, their ideas, strategies, networks and mobilizations provide an interesting and highly relevant field for political ecology research and action in the future.

Third, political ecologists (including myself) should keep on challenging their own assumptions and the 'good'-'bad'-binaries sometimes present in our/my work. As I will

further elaborate in the next section, looking at dam removal has in that sense been a real contribution to this PhD project that allowed me to question my own assumptions and realize how hydraulic infrastructure is inherently entwined with practices and subjectivities, making the reality much more complex and contradictory than easily distinguishable binaries. This in turn also makes a strong case for daring to combine disjunctive case studies in one and the same research project.

7.4 Positionality and methodology: Co-evolving research and researcher

As I explained in the introduction, I started the research on the Ilısu Dam shortly after my return from Turkey, where I had made Turkish and Kurdish friends from the Southeast and visited them in their home city Diyarbakir. The five days I spend with Onur, Süleyman, Gurbet, Halil Ibrahim, Muhammed and Handan were probably one of the most impactful and emotional visits to a new place in my life so far. I was deeply touched by the injustices and suffering that has been shaping the region and their lives, yet the incredible beauty of Kurdish culture and in fact multi-culturalism present in Diyarbakir's streets, bazars, mosques and churches. More than once I burst into tears, feeling very stupid (and helpless) about it as it was not my people and family, not my culture, not my day-to-day life that was affected by discrimination, oppression and conflict. At that time, I was not yet aware of what feminists have termed 'bearing witness' (Oliver, 2015) or 'shared suffering' (Haraway, 2007), which opens up possibilities for being affected by others' suffering and trauma, united not by a shared space or time but by ethics, politics, feelings and solidarity.

I thus started the first research being highly emotional: sad and angry at the same time. This of course influenced my analysis of the Ilısu Dam. I was interested in understanding the different forms of power at work, and specifically the way the Turkish government tried to realize its will concerning the Southeast as well as concerning the massive dam project. The idea that dams serve not only to govern water but also to govern people through water was an eye-opener to me. It made me understand why that dam project was so important, to both the Turkish government and the groups contesting it. It was about water and infrastructure, but it was also about cultural history, self-determination and, in more general terms, the spatial and environmental dimensions of violent conflict. Foucault's governmentality concept, paired with a first approximation to the idea of imaginaries as claims and representations of water, landscapes, issues, problems and solutions, provided a powerful framework for me

to understand how, on the one hand, the Turkish government resourcefully drew on different governmentalities to finally materialize the Ilısu Dam and, on the other hand, how a broad coalition of groups tried to refute these powers through counter-hegemonic imaginaries and narratives. The case of the Ilısu Dam and my own thinking at this early stage of my PhD was thus characterized by conflict and confrontation. For me, there was no doubt about which side I was on: I clearly identified with the claims and demands of the anti-dam coalitions. If I would have had the chance, I would have taken to the streets in Hasankeyf myself without hesitation.

When I went to Lima a few years later, I took this strong political positioning with me. There was no Turkish-Kurdish conflict in Peru, but also here I expected to find maliciousness and injustices in and because of water transfer and hydropower construction. Besides wanting to do research just because I really enjoy it, I was also determined to uncover inequalities and show the Limeños and Limeñas the dispossessions their water demand was causing in the upstream areas. When I realized that the area where water for Lima came from was something little talked about (back in 2015), I found my initial suspicions confirmed. However, with the course of the months, the Lima case taught me to think much more differentiated and question my own assumptions. In Lima, I met engineers in charge of designing and managing urban water supply systems, or operating hydropower plants, personally and live for the first time in my life (besides a visit to a massive dam in Spain with a course I took during my masters).

They welcomed me to their offices, took me to see Lima's main water treatment plant and even organized a trip to the Mantaro watershed for me, where I happily took pictures of myself to later post them on Facebook with the caption "engineer for a day". I realized two things: first, engineers were no 'villains' but actually nice people with good intentions (at least the ones I met) and comprehensible motivations, operating within the requirements, possibilities and mentalities of their respective institutions. Later I found out that these experiences and insight of mine were actually very similar to what Tania Li says in her book *The Will to Improve* about colonial officials, missionaries, bureaucrats and international aid donors in Indonesia: "Their intentions are benevolent, even utopian. They desire to make the world better than it is. Their methods are subtle. If they resort to violence, it is in the name of a higher good – the population at large, the survival of species, the stimulation of growth" (Li, 2007: 5).

Second, I also realized that I understood the engineers involved in hydropower and urban water supply projects. More so, I could completely identify with their fascination and dedication to hydraulic infrastructure. Up to this day, during field stays or when I am on holidays, I love to visit big dams, small or massive irrigation canals, and sluice gates. Not only for wondering what kind of contestations they sparked or didn't spark, but also simply because of their size and the engineering skills at display in these infrastructures. It is fascinating and I can only imagine what kind of grandeur, sublimeness and fulfilment one must feel when standing on top of an infrastructure designed or commissioned by oneself. Is this fascination a sign that I have become drawn into a Foucauldian governmentality web where I have internalized norms of engineering grandeur, without wanting to? How do these 'feelings' about large-scale infrastructure relate to my perspective as a critical political ecology scholar, shaped by my research on the Ilısu Dam? Is this fascination a direct product of my research, or is it rather the other way around: has this fascination led me to conduct research on hydraulic infrastructure?

Maybe it is both: research and researcher co-evolving. In any case, when in Lima, it made me particularly interested in the engineers that planned and constructed the first dams, hydropower plants and later the water transfer in the Mantaro and Rímac watersheds. When I started reading their ideas, their reports and their plans in different archives in Lima, and talked to the nephew of Pablo Boner – the 'father' of the infrastructure complex, if you will – I was even more fascinated and decided to dedicate a whole chapter of my dissertation to the history of the infrastructure system, the people, motivations and imaginaries behind it. It was also then that the notion of imaginaries took on new conceptual and empirical depth for me and that I got particularly interested in the idea of modernity.

But also other than that, during the research on the Lima case, my thinking evolved towards wanting to understand how infrastructure comes to be and with what effects in a more nuanced way. In encounters with community members in the upper watersheds, I realized that it is not a black-and-white story of water deprivation but that the reality is much more complex, that communities are no homogenous entities, that infrastructure is not per se problematic, that contestations or acceptance of infrastructure projects can change with time, that it is not always about water as such but also importantly about *how* projects are implemented and how non-liquid benefits and burdens are distributed.

This more nuanced way of thinking, researching and analysing hydraulic infrastructure, hydrosocial territories and imaginaries was further challenged and eventually developed through the focus on dam removal. Local communities and regional politicians fighting for the conservation of weirs and dams: it was something revolutionary for me and made me question my assumptions about dams, and the relation between dams and communities.[67] I came to realize how once constructed, hydraulic infrastructure changes not only landscapes, but also people's subjectivities, practices and ideas about what nature is. Also, when I presented the idea of my research on which Chapter 6 would later be based at a lunch meeting at Wageningen University, somebody asked me what I thought about dam removal, if it was a 'good' or 'bad' thing. Whereas in the case of the Ilısu Dam I would have provided a clear answer, in the case of dam removal I could not and did not want to give an answer to this. My position changed away from a yes-or-no position, to one where I continue to believe in core values such as equity, democracy, solidarity and respect but without a clear stance towards hydraulic infrastructure.

This is to say that my own imaginary about infrastructure evolved very much because of, and together with, this research. From infrastructure as a tool to control water and people, to infrastructure as site of multiple meanings to which people, communities, politicians and ecosystems can develop manifold relations. This is not to say that critical analysis of infrastructure construction, contestation, functioning and removal is not important. Rather the opposite. As this research has shown, it is socially, politically and academically relevant to open the black box of infrastructure as infrastructure is so incredibly material and visible yet, exactly because of this, prone to potentially and powerfully concealing unequal power relations and injustices. I therefore want to continue questioning which infrastructure is needed and which not, how it comes into being in specific design forms and not others, who is included and excluded from its design, usage and other related decisions, and who benefits or is negatively affected.

I also want to confirm again what I have already claimed in the introduction of this dissertation: that the three chosen case studies make sense, they have contributed to and at the same time reflect my academic, conceptual development as well as my personal development (as Lena the researcher, but also Lena the individual, friend, daughter, sister and partner), as I have outlined above.

[67] I realize that dam removal already existed before I became aware of it and decided to focus the last part of my PhD research on it. In Europe, however, the explicit promotion of dam removal has indeed recently taken on a new, accelerated pace.

This was only possible because of the open, evolving and dynamic methodology. It allowed to ask new and diverse questions, and embark on initially unforeseen inquiries such as those about dam removal and the role of infrastructural and political time and temporalities. Despite of their dissimilar characteristics, the three studied cases are thus related to each other through the centrality of hydraulic infrastructure, imaginaries and territorialization processes. They have each contributed a puzzle piece to the bigger picture. This is not a call for future PhD candidates to stop writing research proposals: I strongly belief in the use of it and have myself written three different ones for this research alone. However, there should be place to adjust that initial proposal, follow water and wander unforeseen paths, let oneself be guided by curiosity and the stories told by people and waters in the research sides, and allow for the co-presence of multiple I's (the researcher but also the individual and the social-political subject).

7.5 Conclusions

To conclude this dissertation, I will concisely answer the central research question *How have contested imaginaries shaped hydraulic infrastructure projects and, in consequence, (re)configured hydrosocial territories in Turkey, Peru and Spain?*

The different case studies have shown the existing diversity of *imaginaries about hydrosocial territories and the role hydraulic infrastructure should play in it* (sub research question 1). In Turkey and Peru, for example, large-scale dams and hydropower plants were imagined to bring national development, civilization and modernity to as 'backward', 'unruly' or 'untapped' imagined areas and populations. It was about changing and governing water and people at the same time. The infrastructures formed part of broader aspirations and were mobilized to materialize these aspirations and imaginaries in the respective hydrosocial territories. At the same time, the case studies have also shown that for each dominant imaginary there is an alternative or counter imaginary. In the case of Spain, for example, dam removal proponents view old dams and weirs as relics of an outdated hydraulic paradigm that needs to be challenged in order for a better, healthier, more natural river governance to emerge. Dam removal then becomes a symbolic and material act to break with earlier modern dam imaginaries, ideologies and techno-political realities.

Besides the specific contents of the imaginaries that varied among the case studies, it is important to note that they reflect old and new societal debates about what

hydrosocial territories are, have been and should be, about how lives should be lived, about the nature of relations between society and nature. The arguments and perspectives of the Swiss engineers shaping the infrastructure system in Lima, for example, can be clearly related to Enlightenment thinking that puts reason, science and technology above all other and that aspires to transform rivers into hard-working laborers, modernizing and civilizing both nature and society. Some of the arguments brought forward by dam removal proponents, on the other hand, remind of romantic thinkers that promoted a return and reconnection with nature as the ultimate, divine goal. This is not to say that history is repeating itself entirely. Rather, debates evolve; they can be buried for some time and revived in a different shape and with different terms at another moment. Studying hydraulic infrastructure from this point of view shows how infrastructure is embedded in broader societal trends and debates, and provides an entry point to understand the material expressions of these debates. It also exemplifies how infrastructural and societal trends are ever shifting, sometimes into unforeseen and truly new directions, sometimes drawing inspiration from earlier thinkers and approaches. This thesis has illuminated discussions on progress and territorialization in specific contexts, moments and through different types of infrastructures. These discussions are ongoing and will continue to go on.

Another key insight of this research is that imaginaries and associated infrastructural interventions are almost always contested. This makes it essential to ask about *if and how imaginaries are promoted, contested and/or accepted by concerned actors* (sub research question 2). Here again, the answers vary between the cases. What is common, however, is that concerned actors try to materialize imaginaries in infrastructure projects through a diverse set of powers, tactics and coalitions. The mobilized powers and strategies vary according to actors' respective starting point and the 'arenas' in which they operate. In the case of the Ilısu Dam, for example, the government employs both force but importantly also capillary power: promoting a discourse about 'inclusive development' and a vision of a 'great Turkey' made possible by the dam, documenting alleged support of local populations and partially recognizing the existence of non-Turkish ethnicities in the project region. In Lima, engineers and their technological capacities were key promoters of modern projects who inscribed their ideas of progress, development and modernity in hydraulic designs and political-geographical interventions. Furthermore, in all cases, access to financial and political resources was central to effectively promote and eventually realize imaginaries.

Again, both infrastructure construction and removal more often than not spark contestations. In Turkey, contestations were open and generated a lot of national and international attention. The dam opposition coalitions were highly dynamic, using multi-scale, international politics and expanding the issue of dam development both geographically and thematically to incorporate Kurdish, environmental and international concerns and actors. In a similar manner, also in the case of the Toranes Dam in Spain those opposed to the removal project managed to mobilize diverse political parties to support their cause, through linking the removal project to other political issues of local rural development and depopulation. As a result, the group of relevant actors dynamically expands, embedding at first sight local infrastructure projects in wider networks, debates, politics and power relations.

At the same time, the case of Lima indicates that there is not always open contestation. Infrastructure projects and related hydrosocial changes may be welcomed and accepted, and accompanying discourses or imaginaries internalized. Especially discourses about development and backwardness or about different role allocations in a hydrosocial territory can become internalized and part of people's identity, showing how disciplinary power works to conduct people's conduct: as in Lima, where some communities have adopted the role of beneficiaries of electricity production or water keepers for the capital city.

In many instances, the reactions to infrastructure projects have to do with the anticipated or actually experienced effects caused by the project designs and constructed/removed infrastructures. In the case of the Ilısu Dam, for example, effects include massive displacement of people, uprooting of archaeological sides, flooding of extensive areas, environmental destruction and changed water flows beyond national borders. These anticipated far-reaching territorial transformations have triggered resistance from diverse groups. However, as the study of dam removal debates in Spain has revealed, not only such dramatic material changes trigger resistance. Also the removal of a small weir can potentially become a contested issue, for example if such an artefact is strongly embedded in local socionatural relations and imaginaries or if the proposed project and way of implementation is associated with other experienced injustices. In the case of the Toranes Dam, the general locally-existing idea of being left behind by political priorities and investments, degraded to an 'extraction zone' only, generated fierce resistance when the dam removal proposal was made public. This again indicates how the studied local infrastructure projects are not so local after all, but always embedded in multi-scalar technopolitical interventions and respective networks.

Regarding the *territorial, material, hydrological and socio-political transformations caused by imaginaries, designs and the respective infrastructure projects* (sub research question 3), the case studies have shown how these are highly diverse. Some effects are crystal clear, such as in the case of the Ilısu Dam, but others can be more subtle, for example shifting authority and terms of water use and control, and creating new patterns of dependency such as in Lima. In the case of water transfers, furthermore, new legal-administrative arrangements help to alienate and de-territorialize water resources from their geographic origins and their possible political implications and effects on other water users. Simultaneously, effects also often mark subjectivities: the ways in which people understand and relate to power, and to human and nonhuman others change as a result of hydroterritorial projects. This is to say that all the evidences and analyses presented for answering the third sub research question about effects, show that hydraulic infrastructure transforms the relations between space, people and materiality in diverse and contested ways: before it is even constructed, throughout its existence and being, and after it completed its originally envisaged lifespan. These processes of life-long transformations take place in between material stability and dynamism. An infrastructure is neither a sticky, elastic Slime toy from the 1990s, nor is it an unchangeable mass of concrete that physically stays identical and that is maintained and used the same way throughout the years. Especially because of water infrastructure's exposure to the elements as well as its embeddedness in human and nonhuman relations, it is to a certain degree ever changing; and so are the associated hydrosocial territorial relations and effects.

Thus, similar to how my own identity as a researcher and my positionality as a citizen of the world changed through this research, so do infrastructure lives: in different momentums from conception to removal, they evolve through and in turn shape shifting material, environmental, political and social relations and lives. They are not inanimate objects but living and acting as the materialization of socio-political relations and debates about the *what* and *who* of our living together. This, in consequence, means that studying hydraulic infrastructure provides a fascinating lens to dissect and understand the questions, struggles and enactments of debates about nature, society and the entwinement of both. As plans, processes and materializations, as socio-technical nodes and mediators in constantly developing human/nonhuman relations, hydraulic infrastructures reflect and co-constitute our socionatural realities, our infrastructural lives. With re-naturalisation and dam removal on the rise, some infrastructure's lives have already come to an end. But others will continue in the future – either in present forms or reincarnated in new designs, new discourses, new environments, new imaginaries, new relations.

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Annex 1 Detailed description of research methods

This Annex provides a detailed description of research methods and interviews conducted in the different case study sides.

Ilısu Dam, Turkey

The main method to analyse the case of the Ilısu Dam was the extensive study of academic and non-academic literature. Prior to its construction, the dam has received massive national, regional and international attention so that there is vast body of information publicly available and published. Most important sources included academic literature, material of NGOs mobilizing against the dam, project reports, press releases and other media. Other sources included movies and websites, as well as literature about the Southeastern Anatolia Project (GAP), the Kurdish question and trans-national anti-dam mobilization, which offered insights about the general context in which the discussions around the Ilısu Dam took place. Mainly English sources were consulted but also a few German and Turkish reports (for the latter using my limited Turkish knowledge and Google Translate).

The analysis of the written and published sources was complemented by five semi-structured interviews in 2013, and one follow-up interview in 2015. In 2013, the interviewees were: a representative of Doğa Derneği (the partner of BirdLife International in Turkey and one of the main Turkish environmental NGOs mobilizing against the construction of the Ilısu Dam); a representative of the Initiative to Keep Hasankeyf Alive (a local coalition of activists and organizations, which has been central in the anti-dam protest); one local resident of Hasankeyf affected by the dam building plans; and two expert scholars on the topics of water dam construction in Turkey at Wageningen University. The interview with Doğa Derneği was conducted in Istanbul, the two expert interviews took place at Wageningen University, and the remaining interviews were conducted on the phone or via online platforms. The follow-up interview in 2015 was with the same representative of the Initiative to Keep Hasankeyf Alive as in 2013. The interviews served to triangulate insights of other written sources and, more importantly, further complemented additional information, specifically about the latest developments and local perspectives on the dam.

List of interviews: Ilısu Dam, Turkey

Date	Organisation	Interviewee	Place of interview
25.03.2013	Wageningen University	Joost Jongerden	Wageningen
11.05.2013	Doğa Derneği	Representative that has worked on the anti-Ilısu Dam campaign	Doğa Derneği Office in Istanbul
21.06.2013	None	Local resident of Hasankeyf	Phone call
25.06.2013	Initiative to Keep Hasankeyf Alive	Representative involved in setting up and running the Initiative	Online, Skype
26.06.2013	Wageningen University	Jeroen Warner	Wageningen
13.02.2015	Initiative to Keep Hasankeyf Alive	Representative involved in setting up and running the Initiative	Online, Skype

Rural-urban water transfers and hydropower plants Lima, Peru

To analyse the territorial transformations associated with the hydraulic infrastructure in Lima, in total 7 months of field research were conducted: 5 months in 2015 and 2 months in 2016. Furthermore, from January 2017 to October 2019 I worked as an advisor with the German development cooperation in Lima in a project of urban drinking water and sanitation management, which allowed me to follow more recent developments in the water management sector in Peru from close by.

The main research methods were semi-structured interviews, archival research and field observations. First, I conducted 69 interviews with key stakeholders (see complete list below): 18 interviews with local residents or peasant farmers, 15 interviews with local community authorities (such as presidents of peasant communities), 14 interviews with officials from government institutions such as for example the Ministry of Housing, Municipal or Regional Governments, 7 interviews with private companies involved in electricity generation and water infrastructure construction in the research area, 5 interviews with the local and national water authorities, 4 interviews with representatives of different departments of Lima's drinking water supply company SEDAPAL, 3 interviews with NGOs, and 3 interviews with experts or researchers working on water

issues in the area. The sites of these interviews were diverse: from posh offices in Lima, village squares in the middle and upper watershed, to irrigation canals, agricultural fields and remote solitary houses in the upper Mantaro watershed. I did not focus on one specific community in the Rímac or upper Mantaro watersheds but rather tried to visit different communities to understand their multiple and diverse perspectives, experiences and perceptions concerning the constructed mega projects. In total, I visited 5 communities in the Santa Eulalia watershed, which is a sub-watershed of the Rímac (Huachupampa, San Pedro de Casta, Huanza, Carampoma, Callahuanca); 2 communities in the Rimac watershed (Matucana, San Mateo); and 4 communities in the upper Mantaro watershed (Huaychao, Huascacocha, Carhuacayan and the city of Cerro de Pasco). Sometimes I only spend a few hours in a community, sometimes I stayed for several days and made repeated visits to the same place.

Second, I made field observations. I followed water flows physically: sometimes from the source to its irrigation on agricultural fields, sometimes only part of its journey. This shed light on the multitude of users and uses the water connects along its course as well as its changing looks, quality and quantity. Seeing how the water changed from an apparently clean and plenty state in the reservoirs in the upper Mantaro watershed, to being used on fields of potatoes, corn or avocado in the middle and lower watersheds, to becoming a reduced and brown sewer close to its mouth in the port of Callao, generated insights about the transforming nature of water and surrounding hydrosocial territories – through time but also importantly through changing materialities and geographies. Other field observations were done during different events and situations such as during traditional celebrations in villages such as for example the annual water festivities in San Juan de Iris; events organized by the National Water Authority; activities of the Global Water Partnership South America that focuses on the Santa Eulalia watershed and where I did a 3 months internship in 2015.

Third, archival research in the National Library of Peru, the General Archive of the Nation in Lima, the archive of the Museum of Electricity and the archive of SEDAPAL was key. I consulted journals dedicated to electricity in Peru, and the main newspapers El Comercio and La Prensa for the years of the hydropower construction (particularly the 1950s) to analyse the historic portrayal and media coverage of Lima's water and electricity problems as well as proposed solutions and actual infrastructure construction. I also analysed historic manuscripts from two important engineers that had distinct visions about Limenian water territories, and letters, reports and pictures provided

by the son of one of these engineers. In the General Archive of the Nation, I studied reports of the database Aguas de Regadio (Irrigation Water) of the former Ministry for Development to get insights on the historic involvement of the government and reports of contestations. In the archive of the Museum of Electricity I consulted the annual reports from the hydropower company; in SEDAPAL's archive I consulted books and reports that documented the development of Lima's drinking water supply system.

List of interviews: Rural-urban water transfers and hydropower plants Lima, Peru

Date	Organisation	Interviewee	Place of interview
12.06.2015	None	Expert of the zone	Lima
16.06.2015	Mancomunidad del Valle de Santa Eulalia	President	Chosica
16.06.2015	Comunidad Campesina of Huanza	President	Huanza
17.06.2015	Comunidad Campesina of Huanza	Peasant farmer and owner of a fish farm	Huanza
17.06.2015	Comunidad Campesina of Huanza	Secretary	Huanza
17.06.2015	Hydroelectric Power Plant Huanza	Engineer	Huanza
18.06.2015	Andean Power	Responsible for community relations	Huanza
18.06.2015	Municipality of Carampoma	Mayor	Carampoma
19.06.2015	Comunidad Campesina Carampoma	President	Carampoma
20.06.2015	Comunidad Campesina Callahuanca	President	Callahuanca
20.06.2015	Comunidad Campesina Callahuanca	Peasant farmer	Callahuanca
21.06.2015	Comunidad Campesina Callahuanca	Peasant farmer	Callahuanca
21.06.2015	Comunidad Campesina Callahuanca	Peasant farmer	Callahuanca
03.08.2015	None	Expert on hydroelectricity generation in Santa Eulalia	Lima

06.08.2015	Organismo de Evaluación y Fiscalización Ambiental (OEFA)	Staff of the Department of Electricity	Lima
06.08.2015	Centro Labor Pasco	Researcher of the Huascacocha project	Lima
07.08.2015	Association of Intercomunidades	President	San Pedro de Casta
10.08.2015	EDEGEL	Representative in charge of hydropower operation	Lima
17.08.2015	SEDAPAL	Staff of the Department of Research and Development	Lima
25.08.2015	Autoridad Local del Agua (ALA) Pasco	Representative	Cerro de Pasco
25.08.2015	Centro Labor Pasco	Representative	Cerro de Pasco
25.08.2015	Centro Labor Pasco	Representative	Cerro de Pasco
26.08.2015	Regional Government of Pasco	Staff of the Department of Natural Resource Management	Cerro de Pasco
26.08.2015	Community Huaychao	Teacher and former member of the negotiation committee	Cerro de Pasco
26.08.2015	Community Huaychao	President of the community Huaychao	Huaychao
26.08.2015	Community Huaychao	Community member Huaychao	Huaychao
26.08.2015	Municipality of Huaychao	Advisor of the mayor	Huaychao
27.08.2015	Cooperative of Huallay	Representative	Huascacocha
27.08.2015	None	Affected resident	Huascacocha
27.08.2015	District of Carhuacayan	Governor	Carhuacayan
27.08.2015	Comunidad Campesina of Carhuacayan	Vice President	Carhuacayan
03.09.2015	SEDAPAL	Staff of the Department of Research and Development	Lima
07.09.2015	SEDAPAL	Director of the 'Team of Social Management of Projects'	Lima
08.09.2015	Consorcio Conenhua/ Buenaventura	Hydrologist of the hydroelectric power plant Huanza	Lima
08.09.2015	Municipality of Huachupampa	Mayor	Lima
11.09.2015	Servicio Nacional de Meteorología e Hidrología del Perú (SENAMHI)	Researcher	Lima

22.09.2015	Rímac Users Association	President	Lima
23.09.2015	Superintendencia Nacional de la Administración de los Servicios de Saneamiento (SUNASS)	Representative	Lima
24.09.2015	Autoridad Local del Agua (ALA) Chillón Rímac Lurín	Administrator	Lima
24.09.2015	Autoridad Nacional del Agua (ANA)	Representative of the Department of Conservation of Water Resources	Lima
25.09.2015	Empresa Peruana de Aguas S.A. (EPASA)	Responsible engineer	Lima
29.09.2015	Ministry of Housing, Construction and Sanitation	Staff involved in the planning of water supply projects for Lima	Lima
30.09.2015	Servicio Nacional de Áreas Naturales Protegidas (SERNANP)	Officer focused on the Junín Lake	Lima
07.03.2016	Autoridad Nacional del Agua (ANA)	Representative of the Department Water Quality	Lima
07.03.2016	Comité de Operación Económica del Sistema Interconectado Nacional (COES)	Representative	Lima
16.03.2016	EDEGEL	Representative	Lima
16.03.2016	Comunidad Campesina San Pedro de Casta	Former member (now living in Lima)	Lima
17.03.2016	Asociacion de Intercomunidades Nor-Huarochirí	President	Chosica
17.03.2016	Comunidad Campesina Mitma	Peasant farmer	Carampoma
17.03.2016	Comunidad Campesina Carampoma	Peasant farmer	Carampoma
18.03.2016	Comunidad Campesina Mitma	Peasant farmer	Carampoma
18.03.2016	Comunidad Campesina Carampoma	Peasant farmer	Carampoma
18.03.2016	Comunidad Campesina Carampoma	Peasant farmer	Carampoma
19.03.2016	Comunidad Campesina Carampoma	Peasant farmer	Carampoma

20.03.2016	Comunidad Campesina Huachupampa	Peasant farmer	Huachupampa
20.03.2016	Comunidad Campesina Huachupampa	Peasant farmer	Huachupampa
20.03.2016	Comunidad Campesina Huachupampa	Peasant farmer	Huachupampa
20.03.2016	Comunidad Campesina Huachupampa	President	Huachupampa
23.03.2016	EDEGEL	Former employee engineer	Lima
28.03.2016	None	Former consult for SEDAPAL	Lima
29.03.2016	Huarochirí Provincial Municipality	Representative of the Department for the Environment	Matucana
29.03.2016	Comunidad Campesina Barrios Bajos	Peasant farmer	Matucana
29.03.2016	Comunidad Campesina Barrios Bajos	President	Matucana
29.03.2016	Municipality of San Mateo	Representative responsible for drinking water	San Mateo
29.03.2016	Comunidad Campesina San Antonio	Secretary	San Mateo
29.03.2016	Comunidad Campesina San Mateo	President	San Mateo
30.03.2016	Municipality of San Mateo	Representative	San Mateo
04.04.2016	Local Water Administration (ALA) Chillón, Rímac, Lurín	Administrator	Lima
26.04.2016	None	Nephew and Co-worker of Pablo Boner	Lima

Dam removal, Spain

My analysis of dam removal discussions in Spain is based on research conducted between July 2020 and May 2021. It included literature review, interviews and participation in relevant events. As the time of research coincided with the worldwide Covid-19 pandemic, large part of the research was conducted online. Policy documents, promotional material as well as newspaper articles and other media sources were analysed to understand the dam removal scenery, its actors as well as promotion and debates. I started with a first general focus on Spain in general, interviewing for example representatives of river basin authorities from different regions, the Ministry for the Ecological Transition and the Demographic Challenge, Spanish environmental NGOs, local citizen initiatives (two in favour of removal, four opposing removal), a regional government, and a representative of a European dam removal organization. After a number of interviews, iconic cases of dam removals that are well known among the dam removal community in Spain crystalized. In the following research phase, I further explored each of them through the revision of relevant literature, websites and media. In the third stage then, I decided to narrow down my focus on the case of the contestations of the Toranes Dam because it exemplifies many of the discussion points and complexities of dam removal projects and because it was ongoing at the time of research. This made it particularly interesting as I could follow developments from close by: from being a rather calm and little reported discussion when I first read about it, to becoming a full-blown, highly political debate with national reach and coverage in the course of the months.

On national and local level, I conducted 26 online interviews in total (see below), participated in several online events organized by Dam Removal Europe and the New Water Culture Foundation in Spain, and revised numerous written sources as well as media reports. I briefly visited the Los Toranes Dam and the municipality of Olba in June 2021, following the physical water course at some parts of its journey, and having informal conversations with people I met on the street or along the irrigation channels.

List of interviews and conversations: Dam removal, Spain

Date	Organisation	Interviewee	Place of interview
08.07.2020	Government of Alicante	Inspector of Cultural Heritage	Online, Skype
14.07.2020	Iberian River Restoration Center CIREF	President and member	Online, Skype
14.07.2020	Ecologistas en Acción	Activist and member	Online, Skype
16.07.2020	AEMS Rios con Vida	General secretary	Online, Skype
21.07.2020	Assuts Banyeres	Founder, representative	Online, Skype
23.07.2020	Sociedad Ecologista Rio Guadaira	Representative	Online, Skype
23.07.2020	Blog Valle Inturia	Blogger	Online, Skype
28.07.2020	AEMS Rios con Vida	Lawyer and member of AEMS	Online, Skype
29.07.2020	World Fish Migration Foundation Spain	Representative	Online, Skype
3.08.2020	Agaden Ecologistas en Acción	Representative	Online, Skype
3.08.2020	River basin authority Tajo	Representative of the Department of Environmental Studies	Online, Skype
5.08.2020	River basin authority Cantabrico	Representative of the Water Commissary	Online, Skype
12.08.2020	Association for the Conservation and Study of Mills	Representative	Online, Skype
17.08.2020	River basin authority Segura	Representative of the Department of Environmental Studies	Online, Skype
10.09.2020	WWF España	Representative Water Program	Online, Skype
10.09.2020	Agencia Catalana del Agua	Representatives Monitoring and Aquatic Ecosystem Improvement Department	Online, Skype
4.11.2020	A Rento do Chan	Representative	Online, Skype
26.03.2021	Government of Navarra	Representative Department of Environmental Management	Online, Skype
13.04.2021	Comunidad de Regantes Olba Mijares	President	Online, Skype
13.04.2021	River basin authority Guadalquivivir	Representative	Online, Skype
14.04.2021	River basin authority Duero	Representative Water Quality Department	Online, Skype
14.04.2021	Ministry of the Environment	Representative Water Protection and Risk Management Department	Online, Skype
15.04.2021	El Mijares No Se Toca	Representative	Online, Skype
20.04.2021	Mijares Vivo	Representative	Online, Skype
20.04.2021	AEMS Rios con Vida	Representative	Online, Skype
29.05.2021		Resident of the municipality of Olba	Olba, Spain (informal conversation)
29.05.2021		Resident of the affected neighborhood Los Gilles	Olba, Spain (informal conversation)
16.06.2021	River basin authority Júcar	Representative Area of Environmental management	Online, Skype

Annex 2 List of PhD related publications

Hommes, L., Boelens, R., & Maat, H. (2016). Contested hydrosocial territories and disputed water governance: Struggles and competing claims over the Ilisu Dam development in southeastern Turkey. *Geoforum*, 71, 9–20.

Hommes, L. (2017). Construcción de represas en el sudeste de Turquía: Luchas y reclamos alrededor de la represa de Ilisu, in: Arroyo Castillo, A., Isch Lopez, E. (Eds.), *Los Caminos Del Agua*, Serie Agua y Sociedad, Sección Justicia Hidrica. Ediciones Abya-Yala, Quito, Ecuador, 133–152.

Hommes, L. (2017). Megaproyectos hidráulicos y aguas urbanizadas: las relaciones urbano-rurales y los territorios hidrosociales en las cuencas de Lima, in: Vila Benites, G., Bonelli, C. (Eds.), *A Contracorriente*, Serie Agua y Sociedad, Sección Justicia Hidrica. Ediciones Abya-Yala, Quito, Ecuador, 359–382.

Hommes, L., & Boelens, R. (2017). Urbanizing rural waters: Rural-urban water transfers and the reconfiguration of hydrosocial territories in Lima. *Political Geography*, 57, 71–80.

Hommes, L., & Boelens, R. (2018). From natural flow to 'working river': hydropower development, modernity and socio-territorial transformations in Lima's Rímac watershed. *Journal of Historical Geography*, 62, 85–95.

Hommes, L., Boelens, R., Duarte-Abadía, B., Hidalgo-Bastidas, J.P., & Hoogesteger, J. (2018). Reconfiguration of Hydrosocial Territories and Struggles for Water Justice, in: Boelens, R., Perreault, T., Vos, J. (Eds.), *Water Justice*. Cambridge University Press, 151–168.

Grainger, S., Hommes, L., Karpouzoglou, T., Perez, K., Buytaert, W., & Dewulf, A. (2019). The development and intersection of highland-coastal scale frames: a case study of water governance in central Peru. *Journal of Environmental Policy & Planning*, 21, 373–390.

Hommes, L. (2019). Desarrollo hidroeléctrico y reconfiguraciones territoriales históricas en la cuenca del Rímac, en Lima, Perú. *Estudios Atacameños*, 63, 233-249.

Hommes, L., Boelens, R., Harris, L.M., & Veldwisch, G.J. (2019). Rural–urban water struggles: urbanizing hydrosocial territories and evolving connections, discourses and identities. *Water International*, 44, 81–94.

Hommes, L., Veldwisch, G.J., Harris, L.M., & Boelens, R. (2019). Evolving connections, discourses and identities in rural–urban water struggles. *Water International*, 44, 243–253.

Hommes, L., Boelens, R., Bleeker, S., Stoltenborg, D., Duarte-Abadía, B., & Vos, J. (2020). Water governmentalities: The shaping of hydrosocial territories, water transfers and rural–urban subjects in Latin America. *Environment and Planning E: Nature and Space*, 3, 399–422.

Hommes, L., Boelens, R., Bleeker, S., Stoltenborg, D., Duarte-Abadía, B., & Vos, J. (2020). Gubernamentalidades del agua: la conformación de los territorios hidrosociales, los trasvases de agua y los sujetos rurales-urbanos en América Latina. *A&P Continuidad*, 7, 10–19.

Hommes, L., currently under review. The ageing of infrastructure and ideologies: Contestations around dam removal in Spain and the temporalities of hydraulic infrastructure. *Water Alternatives*.

Hommes, L., Hoogesteger, J., & Boelens, R., currently under review. (Re)making hydrosocial territories: Materializing and contesting imaginaries and subjectivities through hydraulic infrastructure. *Political Geography*.

Annex 3 WASS Training Certificate

Lena Hommes
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Project proposal writing	WRM/WUR	2016	3
Latin American Studies Programme PhD Course	LASP/CEDLA	2016	3
Coordination of INREF project ('*Urbanization of nature in Latin America*'), including general conceptual development and workshop organization	WRM/WUR	2016 – 2017	3
ArcGIS for socioeconomic research	Universidad Católica del Perú PUCP, Lima	2017	1
Guest editor of a special issue of *Water International* ('*Rural-urban water struggles*')	WRM/WUR with *Water International*	2018 – 2019	2
Advanced Qualitative Research Design and Data Collection, GEO 56806	WUR	2020	6
B) General research related competences			
WASS Introduction course	WASS	2016	1
'*Large-scale hydraulic projects and urbanized rural waters*'	Justicia Hidríca Network Meeting, Cali	2015	1
'*Urbanizing rural waters*'	WUR & SOAS: International Conference Political Ecologies of Conflict, Capitalism and Contestation, Wageningen	2016	1

'*Hydropower development, territorial transformations and discursive strategies in Lima'*	Justicia Hidríca and International Waters: Network Meeting, Wageningen	2016	1
'Thinking through technology: a conceptual exploration to understand rural-urban relations'	Justicia Hidríca Network: Annual Meeting, Cusco	2017	1
'The making of hydrosocial territories'	POLLEN Conference Contested Natures (online)	2020	1
Co-organizer of panel *'Contesting Hydropower: Novel Approaches to Water Conflict'*	American Association of Geographers (AAG): Annual Meeting (online)	2022	1
Reviewer for *Geoforum*, *Environment and Planning E*, *Annals of the American Association of Geographers*, *Journal of Historical Geography* and others	Different journals	2016 – 2022	2
C) Career related competences/personal development			
Language editor	Journal *Open Agriculture* (De Gruyter)	2015 – 2017	2
Start to teach	Education Support Centre / WUR	2019	1.5
Supervising BSc and MSc students course	Education Support Centre / WUR	2020	1
(Re)Designing a course	Education Support Centre / WUR	2020	1.5
Active Bystander	WIMEK	2020	0.1
Popular Science Writing	WASS	2021	1.5
Membership WASS PhD Council	WASS	2020 – 2022	1.5
Supervising BSc and MSc thesis projects	WRM/WUR	2019 – 2022	3
Total			**39.1**

*One credit according to ECTS is on average equivalent to 28 hours of study load

Summary

This dissertation departs from questions about territorialization processes associated with modern hydraulic infrastructure. It asks about which visions and imaginaries form the basis and foundation for hydraulic infrastructure construction and how these imaginaries change through time; how hydraulic infrastructure is a powerful tool to materialize specific imaginaries in expected and unexpected ways; and what effects this brings about for adjacent hydrosocial territories. The central research question is: H*ow have contested imaginaries shaped hydraulic infrastructure projects and, in consequence, (re)configured hydrosocial territories in Turkey, Peru and Spain?*

In order to do so, this research gives analytically deep 'snapshots' of diverse unfinished moments of hydraulic infrastructures, territorial transformations and associated imaginaries. It takes the three diverse contexts of Turkey, Peru and Spain to shed light on different infrastructures, different moments of infrastructural life, and different moments of imaginaries about hydrosocial territories and the role infrastructure should play in it. The aim is for cross-pollination between at first sight dissimilar cases, to shed light on and raise questions about the complexities and dynamics related to infrastructure, territory, water, power and imaginaries. Furthermore, through combining the notions of hydrosocial territories, imaginaries, governmentalities and subjectivities, and drawing from the associated scholarly discussions, this research advances an innovative and comprehensive conceptual framework to scrutinize the role of infrastructure in making and remaking territories.

The first infrastructure I analyse is the 135 metres high and 1820 meters wide Ilısu Dam in southeastern Turkey. This project has been fiercely contested from the start on because of expected negative local social, cultural and environmental effects as well as because of being located in a region with a predominantly Kurdish population that has long suffered under the Turkish-Kurdish conflict. I start with a critical examination of the arguments propagated by the Turkish government and how they are mobilized to materialize the contested dam project through different governmentalities. Importantly, the government employs an inclusive discourse portraying the dam as a symbol of national pride, thereby evading or devaluing protests. This is also embedded in cultural politics that disregard the region's (Kurdish) ethnic make-up with the aim to de-politicise the dam and deny the Kurdish population recognition of their cultural heritage and deed to land. The dam project is thus not purely about governing water but also about governing people through implanting new relations, meanings, values, and distribution and rule-making patterns onto local territories.

However, the dominant hydrosocial dam imaginary is contested by different stakeholders that dynamically build multi-actor, multi-issue and multi-scale coalitions. For example, Kurdish organisations and the Kurdish diaspora see the dam as an assault on Kurdish history, culture and patrimony and consequently mobilize against it. They later ally with national and international environmental NGOs who shift the focus of the anti-dam campaign to the dam's anticipated negative environmental impacts. This demonstrates how the multi-dimensionality of a mega project such as the Ilısu Dam unites actors from different backgrounds under a common goal, while at the same time each actor embeds the anti-dam struggle in their respective broader campaigns and underlying interests, views and positions. Even though the mobilizations seem to have been in vain (as the dam construction was finished in 2018), they have nevertheless succeeded in contesting the dominant imaginary and impeding a one-to-one implementation of the hydrosocial governmentality and infrastructure project as envisaged by the Turkish government.

The analysis of the contestations surrounding the Ilısu Dam in the context of the overarching research question shows (1) how the realization of dam (and other infrastructure) projects relies on the mobilization of different overlapping governmentalities, including subtle 'inclusive' strategies and cultural politics; (2) how actor coalitions unite, strategically and dynamically mobilizing networks, scales and different envisaged dam dimensions to contest the dam construction plans as much as the underlying hydrosocial imaginaries; (3) how imaginaries materialize in dam and resettlement designs, whereas 'un-materialized' imaginaries (in this case of the dam opposition) have important effects for challenging dominant viewpoints and technical, apolitical discourses, as well as claiming recognition for local culture, history and suffering in the context of infrastructure projects.

Chapters 4 and 5 then focus on the infrastructure complex in the Mantaro and Rímac watersheds in central Peru, close to the capital city of Lima. This infrastructure complex is composed of numerous dams in the Andean highlands, a water transfer tunnel that transverses the Andes, seven hydropower plants (HPP) and underground tunnels conveying water between HPPs. This system is crucial for the provision of water supply for the mega city Lima and generates important amounts of hydroelectric power. The analysis focuses specifically on the historic development of the infrastructure complex, the enduring water use arrangements resulting from it and current dynamics that are characterized by a re-remembering of the past. First, I unpack how the successive construction of the HPPs and the connected hydraulic infrastructure

system is a materialization of historic aspirations of modernity, progress, urbanization and electrification. Underlying was an imaginary of a hydro-territorial disequilibrium between fertile lands and population on the Pacific coast and water resources in the Amazon basin, that needed to be overcome by modern technology and the conquest of nature. Furthermore, rural populations in the concerned watersheds were imagined and strategically framed as being in dire need of modernization and progress. Hydropower and related infrastructure development then became a civilizing mission turning savage and supposedly unused waters into workers for progress and saving rural people from the dark. Yet, I also show how imaginaries do not automatically turn into territorial projects, but need additional financial and political resources mobilized to their advantage. In the case of Lima, this included securing support from foreign investors and politically influential actors and later the forming of a powerful alliance of convenience between hydropower and drinking water companies.

Second, the analysis shows how the step-by-step acquisition of control over upstream water resources by hydropower companies and later Lima's drinking water utility continuously changed water flows, water control arrangements and the position of water user groups. However, concrete effects and impacts are ambiguous, differing among places and people. In most cases, communities are still able to use water from the constructed reservoirs, even though the authority and terms of this water use changed and became dependent on the approval of downstream actors. There are also criticisms that centre around injustices in the distribution of water-related benefits, unequal investments that prioritize drinking water access for urban populations over rural access, loss of autonomy and socio-environmental impacts of territorial transformations. At the same time, there are also cases of communities that directly benefited from the HPP's underground conveyance canals, being able to access parts of the water for irrigation of agricultural fields. There is thus no outright water grabbing but rather complex, multi-dimensional relations and dependences. More generally speaking, the analysis shows how infrastructure entangles territories and connects distant places in a relationship of interdependence through hydraulics, normative and political institutions, flows of water, people and ideas. This also clearly demonstrates how urbanization is a symbolic, social, material, multi-scalar endeavour that crosses conventional city boundaries and entwines the rural and the urban in a shared history and rural-urban territory, in which both are differentiated and connected at the same time.

Third, the chapters about Lima show how hydrosocial territories are not stable. Imaginaries, discourses, actor alliances and mechanisms surrounding and sustaining particular infrastructure are changing throughout time and are not as fixed as their materialities seem to suggest. In the face of continued urban water demand, climate change and the resulting anticipation of intensifying competition over water resources, the history of Lima's watersheds is increasingly becoming a matter of negotiation and political debate again, as the diverse concerned actors remember the regional history differently and according to their own particular interests and positions.

Regarding the overarching research question, the analysis of Lima's water infrastructure complex demonstrates (1) how imaginaries, discourses and morals become cemented in concrete hydraulic systems; (2) that in particular imaginaries about the domination and 'development' of water and people through hydraulic engineering are central in modern infrastructure projects; (3) how the hydraulic infrastructure complex reconfigures hydrosocial territories physically, socially, legal-politically and symbolically in profound and lasting ways; (4) how territories and infrastructural materialities are not fixed, but continuously reconfigured through changing objectives and actor alliances, as well as through contestations and a re-remembering of the past.

The last case study of the dissertation analyses dam removal discussions in Spain – a country that is well-known for its historical hydraulic mission that has led to the construction of hundreds of dams. Whereas dam construction similar to the one analysed in previous chapters continues in many parts of the world, in Spain and other European countries and North America there is an increasing promotion of the opposite: dam removal. This is in fact a socio-political choice made possible by changes in the materials, policies, institutions, people, and imaginaries surrounding dams and other river barriers. In particular also an ageing and 'ruin' of earlier imaginaries associated with dams and new ideas about the position of humans in nature are central: Not the domination of nature through humans and technology is seen as desirable anymore, but the liberation of nature from historic human domination for the sake of future biodiversity, human and ecosystem health. At the same time, I also argue that ideas about dam removal and its meaning – locally, practically and symbolically – are not homogenous among actors and institutions in Spain. The idea of dam removal playing a role for shifting encrusted water management paradigms is largely one that exists among environmental NGOs, whereas those working in the river basin authorities portray it as a logical managerial measure at the end of an infrastructure's lifetime.

Furthermore, dam removal sparks contestations at different levels. For example, the ecological view of nature promoted by removal proponents where past human intervention can and should be at least partially undone, is criticized by those that view certain dams and weirs as part of a cultural historic landscape and a 'new nature'. This points to how imaginaries about a river's past and thus also its future do not so much reflect a 'singular true past' but rather current social, cultural and political positioning. To further elaborate on this, I focus on the discussions surrounding the removal of the Toranes Dam in eastern Spain, which has recently received massive political and mediatic attention. The contestations around this removal project are related to the co-existing and divergent imaginaries and practices associated to the dam: Toranes as an ecologically harmful barrier and a structure at the end of its lifespan that is connected to EU norms and regulations on biodiversity, making removal appear a logical course of action; and Toranes as part of the local natural and socio-political environment where it has acquired meanings and functions that defy a clear end of life and thus any straightforward removal. Underlying discussions relate to nature, heritage, and the future and present meaning and use of the dam.

Regarding the overarching research question, the analysis of dam removal in Spain shows (1) that dam removal originates from ageing materials and imaginaries, and upcoming new ideologies that relate to earlier historical discussions about nature and society; (2) how what a dam (and other hydraulic infrastructures) was, is and can be changes with time and is imagined differently by different actors; (3) how studying different momentums in an infrastructure's life, including removal, sheds light on co-existing infrastructural stability and dynamism; (4) that similar to dam construction, also the promotion of dam removal sparks fierce contestations.

In the last part of the thesis, I elaborate insights generated by the joint study of the three cases and the conceptual framework. For example, I discuss dam removal in relation to dam construction, arguing that the 'conventional' modernist separation between nature and society characteristic for modern large-scale infrastructure projects is actually also present in dam removal projects, sparking local protests at the time of implementation. Based on the overarching insights, I further sketch points for new future engagements. I content that we need to first, re-politicise infrastructure projects, making them subject of public discussions and decision-making; and second, acknowledge and in practice incorporate the diversity of actors, opinions, ontologies, epistemologies and hydrosocial practices, encouraging diversity rather than standardization through creating spaces for discussing and co-creating hydrosocial

futures. Such spaces need to pay attention to potentially unequal power relations and move away from blue-print ideas, allowing for dissensus. Lastly, after reflections about how I as researcher and individual person have co-evolved together with this research, I close by answering the central research question. I argue that infrastructure lives constantly develop because of shifting material, environmental, political and social relations in different momentums. Hydraulic infrastructures as plans, processes and materializations, as socio-technical nodes and mediators in constantly developing human/nonhuman relations, reflect and co-constitute our socionatural living together, our infrastructure lives. Hydraulic infrastructures are therefore not inanimate objects but living and acting as the materialization of socio-political relations and debates about the what and who of our living together. This, in consequence, means that studying hydraulic infrastructure provides a fascinating lens to dissect and understand the questions, struggles and enactments of debates about nature, society and the entwinement of both. With re-naturalisation and dam removal on the rise, some infrastructure's lives might have already come to an end. But others will continue in the future – either in present forms or reincarnated in new designs, new discourses, new environments, new imaginaries, new relations.

Resumen

Esta disertación parte de preguntas sobre los procesos de territorialización asociados a la infraestructura hidráulica moderna. Interroga sobre qué visiones e imaginarios forman la base y el fundamento para la construcción de infraestructura hidráulica y cómo estos imaginarios cambian a través del tiempo; cómo la infraestructura hidráulica es una herramienta poderosa para materializar imaginarios específicos en formas esperadas e inesperadas; y qué efectos trae esto para los territorios hidrosociales adyacentes. La pregunta central de la investigación es: *¿Cómo imaginarios en disputa han moldeado proyectos de infraestructura hidráulica y, en consecuencia, (re) configurado territorios hidrosociales en Turquía, Perú y España?*

Para ello, esta investigación ofrece 'instantáneas' de diversos momentos en la vida de infraestructuras hidráulicas, transformaciones territoriales e imaginarios asociados. Toma los diversos contextos de Turquía, Perú y España para analizar diferentes infraestructuras, diferentes momentos de la vida infraestructural y diferentes momentos de los imaginarios sobre los territorios hidrosociales y el papel que la infraestructura debería jugar en ellos. El objetivo es la polinización cruzada entre casos a primera vista disímiles, para alumbrar y cuestionar las complejidades y dinámicas relacionadas con la infraestructura, el territorio, el agua, el poder y los imaginarios. Además, al combinar las nociones de territorios hidrosociales, imaginarios, gubernamentalidades y subjetividades, y a partir de las discusiones académicas asociadas, esta investigación propone un marco conceptual innovador y completo para examinar el papel de la infraestructura en la creación de territorios.

La primera infraestructura que analizo es la presa Ilısu de 135 metros de altura y 1820 metros de ancho en el sureste de Turquía. Este proyecto ha sido ferozmente cuestionado desde el principio debido a los efectos sociales, culturales y ambientales negativos esperados, así como por estar ubicado en una región con una población predominantemente kurda que ha sufrido durante mucho tiempo por el conflicto turco-kurdo. Comienzo con un análisis crítico de los argumentos propagados por el gobierno turco y cómo se los promueven para materializar el proyecto de la represa a través de diferentes gubernamentalidades. Entre otros, el gobierno emplea un discurso inclusivo que retrata a la represa como un símbolo de orgullo nacional, evadiendo o devaluando así las protestas. Esto también está incrustado en las políticas culturales que ignoran la composición étnica (kurda) de la región con el objetivo de despolitizar la represa y negar a la población kurda el reconocimiento de su herencia cultural y

reclamo a la tierra. Por lo tanto, el proyecto de la represa no se trata únicamente de gobernar el agua, sino también de gobernar a las personas mediante la implantación de nuevas relaciones, significados, valores y patrones de distribución y creación de reglas en los territorios locales.

Sin embargo, el imaginario dominante sobre la represa es cuestionado por diferentes actores que construyen dinámicamente coaliciones de múltiples actores, múltiples temas y múltiples escalas. Por ejemplo, las organizaciones kurdas y la diáspora kurda ven la represa como un asalto a la historia, la cultura y el patrimonio kurdo y, en consecuencia, se movilizan contra ella. Luego se alían con organizaciones ambientalistas nacionales e internacionales que cambian el enfoque de la campaña anti-represa a los impactos ambientales negativos anticipados. Esto demuestra cómo la multidimensionalidad de un megaproyecto como la presa de Ilısu une a actores de diferentes orígenes bajo un objetivo común. Al mismo tiempo cada actor integra la lucha contra la represa en sus respectivas campañas según sus intereses, puntos de vista y posiciones. Si bien las movilizaciones parecen haber sido en vano (ya que la construcción de la represa se terminó en 2018), han logrado cuestionar el imaginario dominante e impedir una implementación fácil del proyecto y de la gubernamentalidad hidrosocial previsto por el gobierno turco.

El análisis de las disputas en torno a la represa Ilısu en el contexto de la pregunta principal de investigación muestra (1) cómo la realización de proyectos de represas (y otras infraestructuras) se basa en la movilización de diferentes gubernamentalidades superpuestas, incluidas estrategias sutiles 'inclusivas' y políticas culturales; (2) cómo se unen las coaliciones de actores, movilizando estratégicamente y dinámicamente redes, escalas y diversas dimensiones de la represa para cuestionar los planes de construcción tanto como los imaginarios hidrosociales subyacentes; (3) cómo los imaginarios se materializan en los diseños de represas y reasentamientos, mientras que los imaginarios 'no materializados' (en este caso, de la oposición a la represa) tienen efectos importantes para desafiar los puntos de vista dominantes y los discursos técnicos y apolíticos, así como reclamar el reconocimiento de la cultura local, historia y sufrimiento en el contexto de proyectos de infraestructura.

Luego, los capítulos 4 y 5 se enfocan en el sistema de infraestructura en las cuencas hidrográficas del Mantaro y del Rímac en el centro de Perú, cerca de la capital Lima. Este complejo de infraestructura está compuesto por numerosas represas en el altiplano andino, un túnel transandino, siete centrales hidroeléctricas (CH) y túneles subterráneos

que transportan agua entre las CH. Este sistema es crucial para el abastecimiento de agua para la mega ciudad de Lima y genera importantes cantidades de energía hidroeléctrica. El análisis se enfoca específicamente en el desarrollo histórico del complejo de infraestructura, los arreglos de uso del agua que resultan de él y la dinámica actual que se caracteriza por recordar y repensar el pasado. Primero, analizo cómo la construcción sucesiva de las CH y el sistema de infraestructura hidráulica conectado es una materialización de las aspiraciones históricas de modernidad, progreso, urbanización y electrificación. Subyacía un imaginario de desequilibrio hidroterritorial entre las tierras fértiles y la población en la costa del Pacífico y los recursos hídricos en la cuenca del Amazonas, que necesitaba ser superado por la tecnología moderna y la conquista de la naturaleza. Además, las poblaciones rurales en las cuencas en cuestión fueron imaginadas y enmarcadas estratégicamente como necesitadas de modernización y progreso. La energía hidroeléctrica y el desarrollo de la infraestructura relacionada se convirtieron entonces en una misión civilizadora, convirtiendo aguas salvajes y supuestamente no utilizadas en fuerza para el progreso y salvando a la población rural de la oscuridad. Sin embargo, también muestro cómo los imaginarios no se convierten automáticamente en proyectos territoriales, sino que necesitan la movilización de recursos financieros y políticos. En el caso de Lima, esto incluyó asegurar el apoyo de inversionistas extranjeros y actores políticamente influyentes y luego la formación de una poderosa alianza de conveniencia entre las empresas hidroeléctricas y la empresa prestadora de agua potable y saneamiento.

En segundo lugar, el análisis muestra cómo la adquisición paulatina del control sobre los recursos hídricos aguas arriba por parte de las empresas hidroeléctricas y más tarde de la empresa de agua potable de Lima cambió continuamente los flujos de agua, los arreglos de control del agua y la posición de los grupos de usuarios del agua. Sin embargo, los efectos e impactos son ambiguos y difieren entre lugares y personas. En la mayoría de los casos, las comunidades aún pueden usar el agua de los embalses construidos, aunque la autoridad y los términos de este uso del agua cambiaron y se volvieron dependientes de la aprobación de los actores aguas abajo. También hay críticas que se centran en las injusticias en la distribución de los beneficios relacionados con el agua, las inversiones desiguales que priorizan el acceso al agua potable de las poblaciones urbanas sobre el acceso rural, la pérdida de autonomía y los impactos socioambientales de las transformaciones territoriales. Al mismo tiempo, también hay casos de comunidades que se beneficiaron directamente de los canales subterráneos de conducción de las CH's, pudiendo acceder al agua para el riego de campos agrícolas. Por lo tanto, no existe un acaparamiento de agua absoluto, sino relaciones y

dependencias complejas y multidimensionales. En términos más generales, el análisis muestra cómo la infraestructura entrelaza territorios y conecta lugares alejados en una relación de interdependencia a través de instituciones hidráulicas, normativas y políticas, flujos de agua, personas e ideas. Esto también demuestra claramente cómo la urbanización es un esfuerzo simbólico, social, material y de múltiples escalas que cruza los límites de la ciudad y entrelaza lo rural y lo urbano en una historia compartida y un territorio rural-urbano, en el que los lugares se diferencian y conectan al mismo tiempo.

En tercer lugar, los capítulos sobre Lima muestran cómo los territorios hidrosociales no son estables. Los imaginarios, los discursos, las alianzas de actores y los mecanismos que rodean y sostienen una infraestructura están cambiando a lo largo del tiempo y no son tan fijos como parecen sugerir sus materialidades. Ante la continua demanda urbana de agua, el cambio climático y la anticipación resultante de una competencia cada vez más intensa por los recursos hídricos, la historia de las cuencas hidrográficas de Lima se está volviendo cada vez más un tema de negociación y debate político, ya que los diversos actores interesados recuerdan la historia regional de manera diferente y de acuerdo con sus propios intereses y posiciones particulares.

Con respecto a la pregunta principal de investigación, el análisis del sistema de infraestructura hidráulica de Lima demuestra (1) cómo los imaginarios, los discursos y la moral se cimentan en sistemas hidráulicos concretos; (2) que los imaginarios sobre la dominación y el 'desarrollo' del agua y las personas a través de la ingeniería hidráulica son centrales en los proyectos de infraestructura modernos; (3) cómo el sistema de infraestructura hidráulica reconfigura los territorios hidrosociales de manera física, social, jurídico-política y simbólico; (4) cómo los territorios y las materialidades infraestructurales no son fijos, sino que se reconfiguran continuamente a través de objetivos cambiantes y alianzas de actores, así como a través de contestaciones y rememoraciones del pasado.

El último estudio de caso de la presente disertación analiza las discusiones sobre la demolición de represas en España, un país conocido por su histórica misión hidráulica que ha llevado a la construcción de cientos de represas en todo su territorio. Mientras que en muchas partes del mundo continúa la construcción de presas similares a las analizadas en los capítulos anteriores, en España y otros países europeos y norteamericanos se promueve cada vez más lo contrario: la demolición de presas. Esta es, de hecho, una decisión sociopolítica que es posible debido a los cambios en

los materiales, las políticas, las instituciones, las personas y los imaginarios que rodean a las represas y otras barreras fluviales. En particular, son centrales el envejecimiento y la 'ruina' de los imaginarios anteriores asociados con las represas y las nuevas ideas sobre la posición de los humanos en la naturaleza. Ya no se considera deseable la dominación de la naturaleza a través de la tecnología, sino la liberación de la naturaleza de la histórica dominación humana en aras de la futura biodiversidad, la salud humana y del ecosistema. Al mismo tiempo, también sostengo que las ideas sobre la eliminación de presas y su significado no son homogéneas entre actores e instituciones en España. La idea de que la demolición de represas juega un papel en el cambio de los paradigmas de gestión del agua existe en gran medida entre las organizaciones ambientales, mientras que las que trabajan en las confederaciones hidrográficas lo presentan como una medida de gestión lógica al final de la vida útil de una infraestructura.

Además, la demolición de represas genera controversias en diferentes niveles. Por ejemplo, la visión ecológica de la naturaleza promovida por los defensores de la demolición donde la intervención humana pasada puede y debe ser deshecha, es criticada por aquellos que ven ciertas represas como parte de un paisaje cultural histórico y una 'nueva naturaleza'. Esto indica cómo los imaginarios sobre el pasado de un río y, por lo tanto, también su futuro, no reflejan tanto un 'pasado verdadero singular', sino más bien un posicionamiento social, cultural y político actual. Para profundizar en esto, analizo los debates en torno a la eliminación de la presa Los Toranes en el este de España, que recientemente ha recibido gran atención política y mediática. Las disputas en torno a este proyecto de demolición están relacionadas con imaginarios y prácticas coexistentes y divergentes en torno a la presa: Los Toranes como una barrera ecológicamente dañina y una estructura al final de su vida útil que está conectada con las normas y reglamentos de la UE sobre biodiversidad, haciendo su eliminación parecer un curso de acción lógico; y Los Toranes como parte del entorno natural y sociopolítico local donde ha adquirido significados y funciones que desafían un obvio fin de vida y una eliminación lógica. Las discusiones subyacentes se relacionan con ideas sobre la naturaleza, el patrimonio y el significado y uso futuro y presente de la represa.

Con respecto a la pregunta de investigación principal, el análisis de la demolición de represas en España muestra (1) que esta tendencia se origina a partir de materiales e imaginarios envejecidos, y nuevas ideologías emergentes que se relacionan con discusiones históricas anteriores sobre la naturaleza y la sociedad; (2) cómo lo que fue, es y puede ser una represa (y otras infraestructuras hidráulicas) cambia con el tiempo y es imaginado de manera diferente por diferentes actores; (3) cómo el estudio de diferentes

impulsos en la vida de una infraestructura, incluida la demolición, arroja luz sobre la estabilidad y el dinamismo de la infraestructura; (4) que al igual que la construcción de represas, también la promoción de su demolición genera feroces contestaciones.

En la última parte de la tesis, elaboro ideas generadas por el estudio conjunto de los tres casos y el marco conceptual. Por ejemplo, analizo la demolición de represas en relación con la construcción de represas, argumentando que la separación modernista 'convencional' entre la naturaleza y la sociedad característica de los grandes proyectos de infraestructura moderna también está presente en los proyectos de demolición de represas, lo que provoca protestas locales. En base a los conocimientos y nociones generados, retrato puntos para compromisos y caminos futuros. Sostengo que debemos primero repolitizar los proyectos de infraestructura, haciéndolos objeto de debate público y toma de decisiones. Segundo, es impredecible reconocer y en la práctica incorporar la diversidad de actores, opiniones, ontologías, epistemologías y prácticas hidrosociales, fomentando la diversidad mediante la creación de espacios para discutir y co-crear futuros hidrosociales. Dichos espacios deben prestar atención a las relaciones de poder potencialmente desiguales y permitir el disenso. Por último, después de reflexionar sobre cómo yo, como investigadora e individuo, he co-evolucionado junto con esta investigación, termino respondiendo la pregunta central de la investigación. Argumento que la vida de las infraestructuras se desarrolla constantemente debido a las cambiantes relaciones materiales, ambientales, políticas y sociales en diferentes momentos. Las infraestructuras hidráulicas como planes, procesos y materializaciones, como nodos sociotécnicos y mediadores en constante desarrollo de las relaciones humano/nohumano, reflejan y co-constituyen nuestra convivencia socionatural, nuestras vidas infraestructurales. Las infraestructuras hidráulicas, por tanto, no son objetos inanimados sino que viven y actúan como materialización de relaciones sociopolíticas y debates sobre el qué y el quién de nuestra convivencia. Esto, en consecuencia, significa que el estudio de la infraestructura hidráulica proporciona una lente fascinante para comprender las preguntas, las luchas y las representaciones de los debates sobre la naturaleza, la sociedad y el entrelazamiento de ambos. Con la renaturalización y la eliminación de represas en aumento, es posible que la vida de algunas infraestructuras ya haya llegado a su fin. Pero otras continuarán existiendo en el futuro, ya sea en formas presentes o reencarnadas en nuevos diseños, nuevos discursos, nuevos entornos, nuevos imaginarios, nuevas relaciones.

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About the author

Lena Hommes grew up in Leverkusen, a mid-sized industrial town in Western Germany. Next to the huge factory chimneys of chemical giant Bayer, her interest in social justice and global issues started to sprout. Especially spending a half year as exchange student in South Africa (coincidentally – or not – in another industrial town) made her particularly aware of class, ethnic, gender and global inequalities, and her own position as a privileged white women from Western Europe in it. After graduating as one of the best of her class, Lena then spent a year in Uganda under the weltwärts volunteer program working for a local civil society organization dedicated to providing support to disadvantaged neighbourhoods in the outskirts of Kampala. The experiences during these twelve months made her decide to study International Development Studies at Wageningen University, where she consecutively developed an interest in questions related to natural resources management. While spending an exchange semester at Sabanci University in Istanbul, she became particularly intrigued by the highly complex and conflictive dam projects pushed forward by the Turkish government. This inspired her to pursue her Masters in International Land and Water Management, during which she specialized in questions related to water, environmental justice, infrastructure development and political ecology: during courses but also importantly during different research and internship stays in South America. After graduating with distinction, Lena then worked at the Water Resources Management Group as a researcher, before joining the German development cooperation as an advisor for urban drinking water and sanitation management in Peru for three years. In late 2019, Lena decided to return to Wageningen to continue her PhD project and further pursue and develop her passion for research. She is currently working as a post-doc researcher and lecturer at the Water Resources Management Group at Wageningen University.

Some years ago, her father gave her a quote by Albert Schweitzer for her birthday, which has inspired her ever since:

Ich will unter keinen Umständen ein Allerweltsmensch sein.
Ich habe ein Recht darauf, aus dem Rahmen zu fallen - wenn ich es kann.
Ich wünsche mir Chancen, nicht Sicherheiten.
Ich will kein ausgehaltener Bürger sein, gedemütigt und abgestumpft,
weil der Staat für mich sorgt.
Ich will dem Risiko begegnen, mich nach etwas sehnen und es verwirklichen,
Schiffbruch erleiden und Erfolg haben.

Under no circumstances do I want to be an off-the-rack person.
I have a right to be out of line - if I can.
I wish for opportunities, not security.
I don't want to be a sustained citizen, humiliated and dull, because the State takes care of me.
I want to take the risk, to long for something and make it happen,
to be shipwrecked and have success.

(author's own translation)

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