Towards a more sustainable water future: water governance and Sustainable Development Goal 6 achievability in India

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Humans and the environment in which we live are deeply connected to one another. These interconnections allow for many positive benefits and are foundational to our ability to live on Earth, but also pose many challenges. These challenges are often complex and can lead to negative effects on humans and the environment alike, especially under the pressures of multiple drivers, including climate change. The United Nations created the Sustainable Development Goals (SDGs) to address many of these complex problems through global, regional, and local action. The connection between water resources and humanity – and the resulting challenges – is a potent example of problems the SDGs aim to confront. Particularly, SDG 6 seeks to ensure sustainable access to clean water and sanitation for all, with targets for water quality, efficiency, management, cooperation, capacity building, and ecosystem health. While the SDG 6 vision and targets are admirable, little is known about how to enhance the achievability of this goal, especially considering sustained efforts to address water challenges around the world. Particularly, it is unclear if pre-existing water governance mechanisms, such as institutions, policies, rules, and practices will be able to facilitate SDG 6 achievement.

In order to better understand how those involved in water governance can help enhance the achievability of SDG 6 at multiple scales, a study using qualitative research methods was performed using India as a case study. This included interviews and focus groups to explore three research objectives: (1) current water governance structures and paradigms, (2) capture experiences around success and failure in water projects, and (3) synthesize learnings for insights into enhancing the achievability of SDG 6. Additionally, the concept of the 'water governance landscape' is proposed as a tool to more systematically understand trends in water governance, particularly assessing the structural, functional, and normative dimensions.

This research concludes the water governance landscape in India is not currently poised to facilitate SDG 6 achievement by 2030, but there are many positive trends toward betterment in policies and programs for water governance. Findings of this research regarding enhancement of SDG 6 achievement include the value of determining contextual enabling and hindering factors for water goals. While the subject matter of specific enabling and hindering factors was not surprising, analyzing trends in the suite of enabling and hindering factors highlighted five broad thematic areas important to enhancing SDG 6 achievement: practical considerations, power relations, knowledge & capacity building, policy design, and institutional design. Additionally, the development of better coordinated

water governance processes, the use of diagnostic tools and concepts, and the value of addressing contextual water challenges is discussed. A few generalizable results include the importance of understanding and addressing 'water sustainability challenges' in particular, as well as the importance of scale and context.

Overall, through better understanding the water governance systems under investigation, delineating processes for what helps and hinders SDG 6 achievability, and putting those processes into practice well, clarity for the pathways toward a more sustainable water future can be attained.

Keywords: Sustainable Development Goals, social-ecological systems, achievability, governance, water, water governance, mechanisms, human rights, water challenges, SDG 6

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- GWP: Global Water Partnership
- IWRM: Integrated Water Resources Management
- JMP: Joint Monitoring Programme
- MDGs: Millennium Development Goals
- MDWS: Ministry of Drinking Water and Sanitation
- NDWSPP: National Drinking Water Security Pilot Project
- NRDWP: National Rural Drinking Water Program
- OECD: Organisation for Economic Co-operation and Development
- PEO: Programme Evaluation Organisation
- SD: Sustainable Development
- SDGs: Sustainable Development Goals
- SES: Social-ecological systems
- UN: United Nations
- UNDP: United Nations Development Programme
- UNICEF: United Nations International Children's Emergency Fund
- UNRIC: United Nations Regional Information Centre
- WASH: Water, Sanitation, and Hygiene
- WATSAN: Water and Sanitation
- WCED: World Commission on Environment and Development
- WGL: Water Governance Landscape
- WGM: Water Governance Mechanism
- WHO: World Health Organization
- WWAP: World Water Assessment Program
- WWC: World Water Council

CHAPTER 1
Introduction

1.1 Background

The concept of sustainable development (SD) originated with the United Nations (UN) Stockholm Conference in 1972 with the verbiage of the 'human environment.' The human environment refers to the era in which humans have "acquired the power to transform [their] environment in countless ways on an unprecedented scale" (UN 1972). The very existence of the 'human environment' sparked a call for strategies through which to manage human impacts on planetary systems while maintaining the importance of 'progress' for humankind. One such strategy, dubbed 'sustainable development' was mainstreamed through the publishing of *Our Common Future* in 1987, an outcome of the UN's World Commission on Environment and Development (WCED). The WCED was held largely because of a growing recognition of human impacts on the planet and the negative feedbacks of environmental degradation on humans, felt most acutely in the developing world. *Our Common Future*, also known as the Brundtland Report, produced a definition for sustainable development in this passage:

> Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes (Brundtland and WCED 1987, p1).

While sustainable development as imagined by the authors of the Brundtland Report was meant to challenge the existence of poverty and unsustainable human activities, the world still faces similar problems today to those written about in the Stockholm Declaration (1972) and the Brundtland Report (1987). In recognizing this, over the last three decades the UN has launched numerous initiatives to tackle problems of unsustainable development, most notably through Agenda 21, the former Millennium Development Goals (MDGs), and the new Sustainable Development Goals (SDGs).

The SDGs are both an extension of the Millennium Development Goals (MDGs) and a new agenda crafted to overcome the shortcomings of the MDGs. The MDGs were an ambitious 2000-2015 agenda meant to tackle some of the most pressing issues facing the developing world, such as poverty, hunger, education, health, and gender relations. UN Secretary-General Ban Ki-Moon reflected in the foreword of the Millennium Development Goals Report, "The MDGs helped to lift more than one billion people out of extreme poverty, to make inroads against hunger, to enable more girls to attend school than ever before and to protect our planet. They generated new and innovative partnerships, galvanized public opinion and showed the immense value of setting ambitious goals" (UN, 2015a, p3).

While the MDGs created undeniably positive impacts, the MDGs were not without their critiques (Clemens and Moss 2005; Vandemoortele 2009, 2011; Fehling et al 2013; Higgins 2013). Because the MDGs were focused on ameliorating targets or themes in developing nations, they seemed to be operating under the paradigm of the Global North and the Global South. The concept of the Global North and South as a conceptualization is most basically understood in the economics of a rich-poor divide between the northern hemisphere and the southern hemisphere. The MDGs aimed solutions at developing nations, misleadingly characterizing problems as solely existing in the Global South. In this, the Global North was portrayed as the amiable problem-solver with the financial capital to achieve the MDG targets. It cannot be understated that the problems the MDGs sought to address, such as poverty, hunger, and gender relations exist in developing and developed nations alike, though they may not look the same from country to country. Because sustainable development calls for the planet to be conceptualized more holistically with an integration of human and environmental systems, pursuing high impact outcomes solely for developing nations was unlikely to facilitate the achievement of the MDGs (Fehling et al 2013). Sustainable development in this way invokes a need for the use of social-ecological systems (SES) (Berkes, Folke and Colding 1998; Ostrom 2009). Holling, Berkes, and Folke (1998, 359) support this saying, "Thus, at the heart of sustainable development is renewal and the release of opportunity, both social and ecological, and at relevant temporal and spatial scale..." It additionally calls for movement beyond dividing our social systems into a Global North and South in favor of more holistic and systems thinking in an age of globalization (Therien 1999; Weiss 2009). The SDGs were informed and framed in recognizing the success and the criticisms of the MDGs, as well as with the founding vision for sustainable

development in mind to overcome the Global North-South paradigm and treat the planet more holistically.

While the SDGs undoubtedly represent movement toward more inclusive international agenda-setting, the SDGs are also not without their critiques. Such criticisms pertain to the goals themselves and the process through which they were created. Considering the goals themselves, there may be problems of fit between the goal targets and particular problem contexts (Attaran 2005; Spaiser, Ranganathan, Swain, and Sumpter 2017). For example, problems like poverty (SDG 1) in certain places may be more nuanced or deeply affected by external factors that the SDG 1 targets do not address. Along the same vein, goals like "ending poverty" may be too high-level to be moved into practice within certain contexts (Allen, Metternicht, and Wiedmann 2017). Moving to the critiques of the process through which the SDGs were established, international agenda setting is not independent from the greater power dynamics, geopolitics, and operational status quo present in our world (O'Brien and Brown 2015; Spaiser et al. 2017). Some highlight the idea of international goal-setting itself has even been criticized as an impractical approach to tackling large problems (Head 1977), though the SDGs do highlight the need for involvement of ground-level communities, capacity building, and partnerships in the SDG processes.

Even recognizing these short-comings, the SDGs represent one of the most extensive and aspirational international sustainable development initiatives to date. They differ especially from the MDGs because they are targeted at developed and developing nations alike, affirming that the SDGs target problems like poverty, hunger, consumption, and gender equality as global issues. There are 17 SDGs that encompass numerous topics including: creating healthy ecosystems, ending poverty and hunger, establishing good health and quality education, reducing inequalities, building sustainable cities and transitioning to renewable energy sources, acting on climate change, and working for gender equality. Each goal is an important aspect of the sustainable development of the planet. Considering this, the SDGs also recognize as the Brundtland report did that "humans are transforming the planet in ways that could undermine development gains" meaning progress on these issues can only be sustained through addressing anthropocentric drivers (Griggs et al 2013, 305). These goals are not isolated issues, but rather many of the goals are deeply connected. For example, climate change is heavily impacted by fossil fuel use (Wuebbles & Jain 2001), so when considering the SDG on climate action (SDG 13), it also implicates transitions toward renewable energy (SDG 7). These

kinds of interconnections are apparent amongst the SDGs, but the UN has especially highlighted the significance of interconnections with SDG 6 – universal access to clean water and sanitation.

The importance of SDG 6 in relation to the other 16 goals can be contextualized in numerous ways. First and foremost, SDG 6 encompasses two human rights, those of "universal and equitable access to safe and affordable drinking water" and "access to adequate and equitable sanitation and hygiene for all" (UN 2015b). Clean water and sanitation have only become human rights in recent years (UNRIC 2015), but are now identified as distinct rights to which humankind is entitled and need in order to live a dignified life. SDG 6 seeks to make these human rights universally secured by 2030 (UN 2015c). Secondly, the SDG 6 sub-goals or 'targets' encompass both human and environmental dimensions. Targets 6.1 and 6.2 deal specifically with the human rights noted above, 6.3 and 6.4 consider water quality and efficiency respectively, 6.6 specifically concerns groundwater, and 6.5 deals with integrated water resources management (IWRM). These sub-goals clearly demonstrate the ways in which human and environmental considerations are built into SDG 6. Figure 1.1 below summarizes the SDG 6 targets.

Figure 1.1 – SDG 6 targets *adapted from UN Water and WHO (2016)*

Finally, the UN has delineated that SDG 6 can be directly and indirectly linked to the success of all the other 16 SDGs. For example, SDG 5 – Gender Equality – cannot be achieved while women and girls disproportionately bear the burden of fetching clean water, which time-use studies have shown keep them from leisure, education, and economic activities (UNICEF 2006; Blackden and Wodon 2006; UN 2015c). Appendix A delineates these connections. The significance of this is that when discussing the achievability of the SDGs, 'success' is qualified by saying SDG 6 must be achieved. Overall, the ways in which SDG 6 engages with human rights, integration of social and ecological systems, and the achievement of the other SDGs, makes SDG 6 of paramount importance moving forward.

1.2 Problem statement

While the SDGs, and specifically SDG 6, represent a foray into fulfilling the future the Brundtland Commission envisioned, questions around the achievability of these goals arise. Considering SDG 6, water governance must play a significant role in creating a 'sustainable water future' but there are many key issues water governance must overcome. Conventional paradigms of positivism and individualism (Gawne, Crase, and Watson 2010), paternalism (Ostrom 2009), and one-size-fits-all solutions (Meinzen-Dick 2007) present in today's water world will likely not be sufficient to create a 'sustainable water future.' Conclusions from academic literature and practices highlight this, but these paradigms are still seen throughout policy and practice throughout conventional water management strategies such as those that highlight rigid, top-down, government-centric, or big infrastructure initiatives.

There have been regional, national and global goals on water in the past, from agencies like the UN, the Stockholm International Water Institute, and the Global Water Partnership, but many are not achieved. As one example at the provincial level in Canada, Nova Scotia's Environmental Goals and Sustainable Prosperity Act (EGSPA) created 21 goals to achieve, one of which was "universal implementation of high municipal water quality standards" (Province of Nova Scotia 2010, 2012). While EGSPA goals have been about 85% achieved, the goal on water quality standards has not been met, largely due to the inability of local water agencies to implement systems in line with the goal (Doelle and Lahey 2015). This is concerning in particular as inconsistent water quality and monitoring can undermine the value of achieving other goals, like ensuring access to water and primary treatment of waste water discharge.

At a national level, it is somewhat trickier to find definitive examples of missing the mark on water goals because nations tend to set agendas and visions rather than committing to clearly measureable goals. Canada provides one example of national goal-setting in its commitment to improve water access in First Nations and indigenous communities. As many indigenous communities have been under drinking water advisories for up to 23 years (Hanrahan, Sarkar, and Hudson 2016), the federal government has committed itself to the goal of addressing water quality issues in indigenous communities by March 2021 (Government of Canada n.d.). While it is yet to be seen if Canada will achieve its goal especially considering the long-standing issue with water quality in indigenous communities, it is a rare example of definitive national-level goal-setting. For other countries, if we accept the often seen national 'visions' and 'plans' as examples of soft goal-setting, there are numerous other instances of falling short of envisioned water futures. In an example from India, their Eleventh 5-Year Plan for 2007-2012 set the objectives of universal provisions of clean drinking water by 2009 and to ensure the treatment of all urban waste water entering river systems by 2011-2012 (Planning Commission 2008). Today, an estimated 690 million people in India have inconsistent or impacted access to improved or safe drinking water sources with notably uneven distribution of services geographically, between rural and urban areas, and between the rich and the poor (UNICEF and WHO 2015). Additionally, wastewater treatment is inconsistent. Infrastructure and facilities are often unable to handle the volumes of wastewater being produced, with an estimated 26.5 billion liters of untreated effluent entering water bodies daily (EBTC 2011). While the national goal-setting in India aligns with the SDG 6 targets even prior to the adoption of the Global Goals, it is not necessarily reflective of an ability to achieve the goals, as demonstrated by the current state of water resources and management in India.

Looking to the global level, the recent MDG goal to "halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation" was only partially met (UNICEF and WHO 2015). Many note this MDG target as one of the success stories of the MDGs, and it is indeed a success in part, as the proportion of the population without access to safe drinking water in the world was halved five years ahead of schedule in 2010 (UNICEF and WHO 2015). Without undermining the importance of the progress made on this MDG target, it is also extremely important to understand the shortfalls. The imbedded sanitation target was not met and continues to lag far behind the progress made on drinking water (UNICEF and WHO 2015). This is especially important as sanitation is connected to human and environmental health, as well as water

quality so the failure to meet the sanitation target poses a threat to continued access to safe drinking water (WHO 2004; Bartram and Cairncross 2010). Additionally, the 'sustainability' of access that the MDG called for is highly questionable for both drinking water and sanitation considering the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) indicators. Under the Revised MDG monitoring framework, the indicators for monitoring progress on sustainable access to safe drinking water and basic sanitation were the "[p]roportion of population using an improved drinking water source" and the "[p]roportion of population using an improved sanitation facility" (UN 2005). While the indicators are more complex than portrayed at this macro-level, sustainability and access are not distinguished from one another, and therefore, the indicators do not account for sustainability. This can lead to indicators being unreflective of the reality of an 'improved' source, such as the common situation of bore wells running dry from groundwater depletion (Mehta 2000; Anuraga et al 2006; Srinivasan et al 2010). From the challenges of infrastructure to finances to environmental sustainability and beyond, these failures from around the world reveal the significant barriers faced by water governance mechanisms in the achievement of diverse goals on water.

With these challenges to reaching water goals in mind, it is apparent there is a governance challenge to be investigated and overcome. Governance can be understood as "the interrelated and increasingly integrated system of formal and informal rules [institutions], rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change" (Biermann et al. 2009, p4). In the case of the water goals explored above and SDG 6, the desired future toward which society should be steered is agreed upon. The governance challenge is then how to get there and if governance systems will need to change in order to do it. Many governance systems have made incremental progress on pressing issues facing environment and humans since 1972, but have by in large continued to operate under the conventional paradigms and underperform on water goals. For example, while there has been progress on the participatory aspects of water governance, the Global Water Partnership has been criticized for simply appearing participatory, while ignoring or marginalizing the opinions of some populations (Conca 2005). Considering this and the examples of failure to meet water goals, it is unclear whether current water governance systems will be able to facilitate the achievement of goals like SDG 6 (Rogers and Hall, 2003; Bingeman *et al.* 2004; Lautze *et al.* 2011). By using SDG 6 as the focal point of investigation, I will seek to understand how current

water governance systems may impact the achievement of SDG 6 targets, as well as identify avenues to enhance SDG 6 achievability moving into this new 2030 agenda. In particular, the alignment in India with the SDG 6 vision and the concentration of people impacted by a lack of access to clean water and sanitation makes India a noteworthy and useful case study for investigation.

While the failures explored above in reaching multi-level water goals further support the needed for investigation into the water governance challenge of meeting SDG 6, it should not follow that goals should be more realistic or less ambitious. Considering the ambitious marks set by the UN in the MDG agenda, UN Secretary General Ban Ki Moon writes, "The MDGs helped to lift more than one billion people out of extreme poverty, to make inroads against hunger, to enable more girls to attend school than ever before and to protect our planet. They generated new and innovative partnerships, galvanized public opinion and showed the immense value of setting ambitious goals" (UN 2015a). The SDGs are perhaps rather more ambitious, especially noting the complex issues with which they engage, aptly illustrated by the complexities surrounding water sustainability for humans and the environment captured in the SDG 6 targets. While there is a governance challenge to explore around water governance systems, water goal achievement, and enhancing goal achievability, ambitious goal setting often calls on those involved to push the current governance systems to the boundaries of productivity (Majumdar and Marcus 2001; Fukuda-Parr 2010; Kelman 2011) demonstrating the value of pursuing ambitious goals. In exploring water governance mechanisms in relation to enhancing SDG 6 achievability, I hope to contribute to improving the governance systems in which these laudably ambitious goals are pursued.

1.3 Research purpose and objectives

With the governance challenge of how to reach our shared water goals in mind, targeted research may offer insights for addressing this challenge.

1.3.1 Purpose statement

To investigate current water governance paradigms (structures, functions, norms) and how to use multi-level experiences with water governance to enhance the achievability of SDG 6, using India as a case study to focus investigation.

1.3.2 Objectives

Three objectives give structure to this research, detailed in Table 1.1 below.

Table 1.1 – Research Objectives

Objective 1	To explore and analyze the existing water governance mechanisms (institutions, instruments, treaties etc.) that can either facilitate or impede water governance at multiple levels with attention to the SDG 6 on water
Objective 2	To capture multi-level experiences around success and failure in water governance for SDG 6 targets, especially key factors contributing to and/or hindering SDG 6 achievement
Objective 3	To synthesize insights and suggest ways in which existing governance mechanisms can be further strengthened on multiple scales in relation to SDG 6

1.4 Significance and relevance

This study is significant for three reasons: rights, water governance, and indicators. Because SDG 6 is connected to the human rights of clean water and sanitation, it has a significant human dimension. As it stands, according to the World Health Organization (WHO) and UNICEF Joint Monitoring Programme (2015), 663 million people in the world lack access to clean water and 2.4 billion lack access to improved sanitation services. This translates to about third of the world population whose human rights to clean water and sanitation are impacted. In India, this number is a staggering amount of the population, with 334 million people or more than 25% of the entire population. This study will look at the ability to achieve universal access to clean water and will seek to contribute to improvements on access to water rights through examining water governance. Water governance is defined as "the range of political, social, economic and administrative systems that are in place to regulate development and management of water resources and provisions of water services [for humans and environment] at different levels of society" (Rogers and Hall 2003, p16). This parallels the definition of governance explored earlier in many ways, but bounds the aims of governance specifically around human interactions with water resources. Water governance is important because it concerns how decisions are made about water and through what means decisions are put into action at different scales. While there is significant literature on water governance, it has not been explored yet in relation to the SDGs, especially SGD 6. By understanding better how water governance and its mechanisms help or hinder the achievability of SDG 6, decision-makers and

practitioners can better understand how to make progress on SDG 6 through water governance. The problem of SDG 6 achievability is also significant because holistic indicators do not currently exist. The framework for monitoring and indicators, which is currently being developed through the UN and other collaborators, is aimed at exploring if SDG 6 targets have been met, but it does not engage with the questions of *how* or *why* targets have been reached or missed. In this study, I will strive to contribute to progress on the human right to clean water, contextualizing the role of water governance and its mechanisms in SDG 6, while also identifying factors for good water governance in the context of SDG 6 targets and achievability.

1.5 Definition of Key Terms

Because there is significant diversity in the definition of many of the key terms employed in this research, below are the definitions of a few key terms that will be found referenced throughout this document, presented in a table for convenience. These definitions are accompanied by a short justification for the chosen definition.

Table 1.2 – Definition of Key Terms

KEY TERM	DEFINITION	JUSTIFICATION
Adaptive Co-Management	"an approach to ecosystem governance, as a partnership between the state or regulating authority, scientific and media institutions, resource users and "other civil society groups" (Adger 2005). Adaptive governance principles (Clark and Clarke 2011) include (1) the degree of cross-scale interaction between project participants and other governance levels; (2) the "learning and adaptation processes" that have occurred; (3) the extent of shared understandings about the goals and vision for the initiative" (Fabricius and Currie 2015, p149)	This definition, while not succinct, synthesizes the efforts of other scholars to show the evolution of ACM as it is derived from the two concepts of 'adaptive management' and 'co management'. It was chosen to recognize this history, academic endeavor to clarify ACM as a concept, and honor the context of complexity.
Governance	"[T]he interrelated and increasingly integrated system of formal and informal rules [institutions], rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and	This definition was chosen specifically for its operational considerations of social-ecological systems (SES) and scale. This will enable the use of SES as a critical lens through which to examine SDG 6 achievability, as well as differentiate between multiple scales of governance.

	local environmental change" (Biermann et al. 2009, p4)	
Social-ecological systems (SES)	SES is defined by Redman et al (2004) as: • a coherent system of biophysical and social factors that regularly interact in a resilient, sustained manner; • a system that is defined at several spatial, temporal, and organizational scales, which may be hierarchically linked; • a set of critical resources (natural, socioeconomic, and cultural) whose flow and use is regulated by a combination of ecological and social systems; • and a perpetually dynamic, complex system with continuous adaptation (Burch and DeLuca 1984; Machlis and others 1997).	These definitions of SES were chosen to encompass the diverse social-ecological contexts the SDGs are applied to and the ways in which scale can invoke different interactions in and between SES.
Sustainable Development	The "ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987)	This definition was chosen as it is one of the most widely utilized definitions of sustainable development, but will be supplemented with academic and gray literature throughout the study in order to approach the topic of SD with sufficient rigor.
Water Governance	"the range of political, social, economic and administrative systems that are in place to regulate development and management of water resources and provisions of water services [for humans and environment] at different levels of society" (Rogers and Hall 2003, p16)	This definition was chosen because it was created by the Global Water Partnership and World Water Council, prominent collaborative initiatives that played a large role in the movements toward IWRM that are reflected in the SDG 6 language N.B.: the words "for humans and environment" were added in order to make this definition more explicitly encompassing of the SDG 6 targets that reflect on governance within social-ecological systems (SES) and were not original to the GWP and WWC definition.

Water Governance Mechanisms	The avenues (i.e. rules, institutions, policies, partnerships, etc.) through which decisions in water governance (and other relevant forces) are transformed into outputs and/or actions	This definition was created in order to be inclusive of the many different ways in which governance objectives are mobilized and accomplished.
Water Management	"the application of structural and non-structural measures to control natural and man-made water resources systems for beneficial human and environmental purposes" (Grigg 1996)	This definition was chosen as it is one of the foundational definitions for water management and clearly distinguishes it from water governance.
Water Security	"a multi-dimensional concept that recognises that sufficient good quality water is needed for social, economic and cultural uses while, at the same time, adequate water is required to sustain and enhance important ecosystem functions" (de Loë et al. 2007, piii)	This definition was chosen because it aligns well with the holistic suite of targets in SDG 6 N.B.: this definition can also be used to understand what 'sustainable' access to clean drinking water means in the SDG 6 verbiage

1.6 Limitations of the study

There are a few limitations to this study. This research is designed using a case study in India to contextualize the achievability of SDG 6 and water governance in a concrete spatial scale, but SDG 6 is ultimately a 'Global Goal'. Thus, using a country-based case study means generalizability to the global scale may be difficult. Additionally, the eight SDG 6 targets (see Appendix A) represent diverse subject matter that calls for a more extensive and interdisciplinary investigation. While I will strive to reflect on as many of the targets as possible in my research, target 6.1 is of principal concern. Each other target represents a rich area for investigation and can only be peripherally incorporated. Finally, the SDGs represent a new area of investigation. Because the SDGs are a new agenda, studies are only just beginning to be undertaken surrounding the SDGs. Therefore, there is a limited body of literature with which to situate this research on SDG 6, making it more exploratory in nature.

1.7 Overview

Following the introduction, this research will synthesize the relevant literature surrounding the research purpose and objectives. This will include topics connected to sustainable development in theory and practice, international goal setting, the governance of water resources, and social-ecological systems. A discussion of the conceptual framework used to guide this research will conclude the literature review. After the survey of the literature, the methods and methodology

employed in this qualitative study will be detailed. This will include an in-depth look at the research design, sampling, field work, data handling, and analysis undertaken. Following the methods and methodology, each of the three objectives will be explored in their own respective chapters covering the water governance landscape in India, participants' perceptions around water governance, and a synthesis of findings and results. Finally, a conclusion chapter linking results to the literature and summarizing recommendations will situate contributions toward a more sustainable water future.

CHAPTER 2
Literature Review

There are many important works both practical and academic in nature, which have informed this research and given it a strong foundation from which to examine my objectives. As the bodies of literature surrounding water and sustainability are vast, this chapter details a selection of the relevant literature for water governance and SDG 6 achievability. Three literature areas in particular provide conceptual direction to this research: (1) sustainable development and the Sustainable Development Goals; (2) water governance; and (3) social-ecological systems.

2.1 Sustainable Development and the Sustainable Development Goals

Sustainable Development (SD) is an important construct for global governance with its prominence as a focal point of international cooperation. It has importance for navigating different local, regional, and international contexts, as well as temporal and spatial scales. SD has also grown to imply complexity especially considering its many definitions, myriad international initiatives, and involvement of both human and environmental systems. Moreover, the use of SD as a buzzword has further diluted its meaning. Herman E. Daly (1990, p1) wrote on this dilution, saying, "The term 'sustainable development'… ha[s] become very familiar while [its] meaning ha[s] remained vague." While this study employs the original definition of SD as derived from the Brundtland Report (1987), it is valuable to explore the subsequent historical development of SD as a concept in order to clarify and qualify the meaning of SD in the present.

From its origins to today, SD has been incorporated into many international initiatives. The Stockholm Declaration (1972) was the outcome of the United Nations Conference on the Human Environment which directly recognized the connections between human actions and environmental consequences. The Stockholm Declaration coincided with the release of Donella Meadow's *Limits to Growth* (1972) which explored planetary boundaries in relation to the evidently held paradigm of societal growth without consequence or limits. These two documents made explicit the emergent trajectory of unsustainable human impacts on planetary systems at numerous scales, which has informed global agenda-setting over the last three decades (Glasbergen et al. 2007).

The historical trajectory of SD in international initiatives as well as the ambiguous nature of the Brundtland Commission's definition of SD have inspired a variety of practical and academic pursuits to further clarify the concept of SD. The Brundtland Report defines SD as the "ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). This definition has informed further forays into clarity for SD's meaning with such concerns as indicators, what is to be sustained, what is to be developed, and the temporal period of concern (Kates et al 2005). Economist Herman E. Daly (1990) highlighted the challenge of having clarity, accuracy and generality coinciding with each other in defining sustainable development, namely because sustainable development is meant to be a global principle in a world of contradicting political systems and a plurality of values. While this is valid, it has not stopped academics and different global initiatives from trying to define SD with more clarity. From the academic research, Kates et al (2005) provide a useful summary of the ways in which SD can be defined, namely: from its origins in the Brundtland Commission, through what it seeks to achieve, and in how it is measured (indicators). Looking to higher scale initiatives (e.g. MDGs, 'Sustainability Transition' from the Board on SD, 'Great Transition' from the Global Scenario Group), they seem more so to concern themselves with the aims of sustainable development – or the vision for a desired future state – as its defining feature (Kates et al. 2005). With this notion, SD can be understood as a malleable tool through which to achieve different objectives. National, regional and local utilizations of SD more so define SD through respectively chosen indicators that allow for contextual nuance. All these interpretations of SD especially highlight the diverse contexts through which sustainable development can be and is applied.

From the history of SD and the variety of definitions, five key factors characterizing sustainable development emerge: temporal scale, equity, aim, indicators, and values. Temporal scale and equity are both derivatives of the Brundtland Commission's definition of SD. This is seen in the line, "without compromising the ability of future generations to meet their own needs," where "future generations" invokes temporal considerations and "without compromising the ability" implicates equity (Brundtland and WCED 1987). The term "future generations" implies considering at least 2 generations into the future, but others argue that true sustainability and SD can only come from thinking on much longer temporal scales, such as seven generations into the future (Clarkson et al. 1992). No matter the length of time, it is clear that temporal scale is a key factor in SD. Equity as a

key factor is a little more nuanced. This nuance is derived from the differences in intergenerational equity (between many generations) and intragenerational equity (within one generation). Only intergenerational equity is explicit in Brundtland's (1987) definition, but SD implicitly involves intragenerational equity as well. Though intragenerational equity is not explicitly noted in the Brundtland Commission definition of SD, it can be inferred because inequities are a major cause of environmental degradation, amplified through its cumulative effects on the planet from conditions of extreme poverty and affluence alike (Beder 2000). Further academic and practical applications of SD have shown the aim of initiatives to be a key factor characterizing SD as well. Because SD is applied across diverse contexts, the aim of SD is malleable. While this allows SD to be used widely, it also means there should be critical reflection on what is to be sustained and what is to be developed (Kates et al. 2005). A sub-component of this factor is that 'what is to be sustained' is largely where the environmental concerns are incorporated and 'what is to be developed' almost exclusively concerns human systems. These two components constitute the aim of actions around SD. If we accept that aim is a key factor of sustainable development, then indicators for the aim must also be considered key factors characterizing SD (Kates et al. 2005). Understanding progress on the aims of SD can only be attained through indicators that measure progress quantitatively and qualitatively. As an overarching theme, values are also important because they influence perceptions and inform prioritizations of what matters considering temporal scale, equity, aim, and indicators.

These five key factors characterizing SD are noticeable throughout the Sustainable Development Goals (SDGs) and are demonstrative of the vision for tangible outcomes in SD. The guiding principles of the SDGs are established in the Declaration section of the 2030 Agenda (2015):

> The new Agenda is guided by the purposes and principles of the Charter of the United Nations, including full respect for international law. It is grounded in the Universal Declaration of Human Rights, international human rights treaties, the Millennium Declaration and the 2005 World Summit Outcome. It is informed by other instruments such as the Declaration on the Right to Development… We reaffirm the outcomes of all major United Nations conferences and summits which have laid a solid foundation for sustainable development and have helped to *shape the new Agenda*… We reaffirm all the principles of the Rio Declaration on Environment and Development, including, inter alia, the principle of *common but differentiated* responsibilities… The challenges and commitments identified at these major conferences and summits are interrelated and *call*

> *for integrated solutions*. To address them effectively, *a new approach* is needed. Sustainable development recognizes that eradicating poverty in all its forms and dimensions, *combating inequality* within and among countries, preserving the planet, creating *sustained, inclusive and sustainable* economic growth and fostering social inclusion are linked to each and are independent (emphasis added).

These guiding principles informed the creation of the SDGs and the italicized sections exemplify the relevance of the five key factors of SD in the framing of the SDG agenda.

As a focal lens through which to engage with these guiding principles, SDG 6 connects tangibly to the key factors characterizing SD. This can further be seen in exploring the SDG 6 targets. As stated in the introduction, SDG 6 targets 6.1 and 6.2 deal specifically with the human rights to clean water and sanitation, 6.3 and 6.4 consider water quality and efficiency respectively, 6.6 specifically concerns groundwater, and 6.5 deals with IWRM (see Appendix A for details). Through these targets, the complex situation surrounding the sustainable development of water for people and planet is made more explicit. SDG 6 plays an integral role as a foundation for accomplishing of the other SDGs and therefore fulfilling the vision set out in the guiding principles. The targets of SDG 6 delineate the diverse contexts in which this goal is applied and infer the omnipresence of water in our human and environmental systems. The UN made a salient infographic for the 2015 World Water Day which further clarifies the specific connections SDG 6 targets have with the 16 other SDGs (Appendix A). The SDG 6 targets and their corresponding connections with the other SDGs show the significance of water in our world, and overall how SDG 6 accomplishment is integral to the sustainable development of the planet.

Recognizing their importance, SD and the SDGs are also critiqued in the literature because of the ambiguity and generality which they seem to encompass (Fehling et al 2013). While this can be disadvantageous in some scenarios, the ambiguity and generality can also be seen as a strength. Considering the limitations, it is valid and understandable that the lack of specificity on what constitutes SD or success on the SDGs through measureable outcomes is a concern for many. The scientific method often calls for and thrives through specificity of what's being investigated and measured (Creswell 2014). This reasoning is replicated in the use of program evaluation criteria as well and the quantified measures of success for the SDGs will make accountability and progress more explicit. In this instance, a lack a specificity would be harmful to our understanding of progress

toward a more sustainable future. While this concern is justified in many ways, the ambiguity and generality of SD and the SDGs also enables the very existence of global initiatives. Much of the literature recognizes the importance of context in sustainability initiatives, especially surrounding water (Mollinga, Meinzen-Dick, and Merrey 2007; Runhaar and Driessen 2007; Pahl-Wostl et al. 2008; Pahl-Wostl et al. 2010). Because context matters, generality allows more of the world to be engaged on global agenda-setting including efforts toward sustainable development like the SDGs. On sustainability as an emerging scientific field, Kajikawa (2008, p216) writes, "[S]ustainability science is not a 'science' by any usual definition—that is, it is not yet a set of principles by which knowledge of sustainability may be systematically built. Rather, it consists of a plethora of ideas and perspectives, sometimes conflicting, by which one might hope to achieve a viable future for humankind. Although the importance of sustainability is well recognized, the interdisciplinary character of the research hampers us in grasping the entire structure of sustainability science." This interdisciplinary nature calls for generality at least in part because of the conflict that arises in application of SD and the SDGs to different contexts. It also shows the need for research that explores ways in which knowledge on sustainability can be systematic built.

Turning to the practical implementation of SD, sustainable development also implies a need for adaptiveness. The word 'sustainable' can be also be presented as 'sustained over time.' As longer temporal scales are considered, changes in the system are more likely, especially considering pressures from human interventions (Berkes, Colding and Folke 2008). This means 'sustainable' development – which is characterized in part by a temporal component – is broadly characterized by change as well. Folke et al. (2002, p437) summarize this saying, "The goal of sustainable development is to create and maintain prosperous social, economic, and ecological systems. These systems are intimately linked: humanity depends on services of ecosystems for its wealth and security. Moreover, humans can transform ecosystems into more or less desirable conditions." This transformation from human intervention happens over different temporal scales, but changes – and human responses to it – are ubiquitous in a dynamic world. 'Change' throughout both human and environmental systems can then be considered a sixth factor by which sustainable development is characterized as SD must respond to changes in order to be literally 'sustained over time' (Smit et al. 2001; Grin, Rotmans and Schot 2010).

The conclusion drawn in much of the literature is that the dynamic quality of our human and environmental systems then requires dynamic, responsive, and proactive management strategies (Armitage, Berkes and Doubleday 2007; Reckien et al. 2017). In the case of sustainable development and water, 'adaptive co-management' is a management strategy that is reviewed, recommended, and very visible in the literature (Pahl-Wostl 2007; Huitema et al. 2009; Engle et al. 2011). Adaptive co-management (ACM) can be defined as "an approach to ecosystem governance, as a partnership between the state or regulating authority, scientific and media institutions, resource users and other civil society groups" (Fabricius and Currie 2015, p149). The usefulness and need for strategies like ACM that address change, complexity, and different stakeholders are further supported by the importance of context in determining suitable water suitability initiatives (Pahl-Wostl et al. 2008). Furthermore, the changes in particular social and ecological contexts likely require differentiated adaptive strategies (Engle et al. 2011; Fabricius and Currie 2015). For SDG 6 in particular, the need for adaptive management can be connected to all the targets as drivers, stressors, and compounding factors influencing the targets which may change over time, especially under conditions of climate change. Reaching and sustaining SDG 6 achievement over time will then have to address these dynamics of change, such as through the use of ACM.

2.2 Governing Water

As noted in Biermann et al.'s (2009) definition, governance involves responses to environmental change in general, but water provides a particularly poignant example. Noting the assertion that there is a governance challenge to be investigated surrounding water and SDG 6 achievement, Ken Conca reinforces the relevance of using water as a focal lens (2005, p70) writing, "The political dynamics surrounding water make it . . . a promising place to look for the emergences of alternative institutional forms of transnational, international, or even global-scale institution building." This arena which Conca refers to can be summarized as water governance for SDG 6 achievement. Water governance is "the range of political, social, economic and administrative systems that are in place to regulate development and management of water resources and provisions of water services [for humans and environment] at different levels of society" (Rogers and Hall 2003, p16). Water governance should not be confused or equated to water management which is defined by Grigg (1996) as "the application of structural and non-structural measures to control natural and man-made water resources systems for beneficial human and environmental purposes." In other words,

water management can be equated with the direct applications of water governance on the ground. Lautze and others (2011, p4) succinctly differentiate water management from water governance, writing,

> Whereas water governance is the set of process and institutions through which management goals are identified, water management is charged with implementing the practical measures to achieve those goals. More simply, water management aims to improve outcomes directly, where water governance seeks to define what good outcomes are and align management practices with those goals.

It can then follow that water governance is at least somewhat inclusive of water management considerations in the way governance functions like decision-making and policy-setting translate to implementation. The term 'water governance' as used throughout this thesis should be considered to include water management, but when the differences between water governance and water management are important to highlight, they will be discussed as two separate concepts.

SDG 6 represents high-level agenda setting for water governance and management, also encompassing the complexities of navigating not just human, but also environmental needs for water (Lele 2017). This social-environmental arena of water governance is of particular importance to my own research because current decision-making paradigms in water governance seem to be undergoing a transition (Pahl-Wostl et al 2010). Historically, decision-making and actions around water resources and provisioning have been largely characterized by paradigms of positivism, individualism, and paternalism (Conca 2005; Meissner 2016). This is contrasted with ways in which more recent developments derived from research are being incorporated into modern water governance, like integrated water resources management (IWRM) and adaptive co-management (ACM), among other concepts (Parkes et al. 2010; Engle et al. 2011; Halbe et al. 2013; de Loë and Patterson 2017). IWRM in particular has been a focus of water practice over the last two decades and can be understood as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems" (GWP 2000). This includes dimensions such as coordinated water basin planning, collaboration, and consideration of sustainability of environmental resources and ecosystems. From IWRM to ACM and beyond, different responses to the pressing situations facing humans and environment have emerged that challenge the conventional management of water, emphasizing the need for systemic change in water governance (Conca 2005;

Nadasdy 2007; Pahl-Wostl et al 2010; Parkes et al. 2010; Foerster 2011; Pollard and du Toit 2011; de Loë and Patterson 2017). This dynamic of and need for change has been affirmed as conventional management and prescriptive solutions fail (Matondo 2002; Bakker 2010; Farrelly and Brown 2011), resulting in shifts in water management practice. These changes have been and continue to be studied across many different temporal and spatial scales (Mollinga, Meinzen-Dick and Merrey 2007; de Loë and Patterson 2017; Woodhouse and Muller 2017). Within this changing trajectory, water governance more heavily considers human (Rogers and Hall 2003; de Loë and Patterson 2017), ecological (Forester 2011; de Loë and Patterson 2017), and collaborative (Conca 2005; Engle et al. 2011; Fabricius and Currie 2015) dimensions particular to the different scales. Because it is unclear how current water governance paradigms and trajectories will affect SDG 6 achievability especially considering international, national, and local scales, water governance needs additional investigation and reflection on how the trajectory of change will enhance or hinder global goals like SDG 6.

Reflecting on the need for critical engagement on this topic, the concept of 'water governance' itself has been explored in a significant amount of academic literature, but has been significantly critiqued at its foundations. Franks and Cleaver (2007, p292) write, "In spite of the increasing emphasis on its importance, there is a surprising lack of theoretical analysis and debate of the core concepts of water governance. This may partly result from the focus on good governance as a normative set of principles such as accountability, transparency and probity (ADB, 1999; McGranahan and Satterthwaite, 2006). It may also partly result from the fact that elements of water governance are taken up under other concepts such as rights, integrated water resources management, participation and partnerships (Ryan, 2004)." While my thesis employs the definition of water governance created by Rogers and Hall (2003), this definition was born from the Global Water Partnership (GWP) and not from academic investigation, reflection, or analysis. As noted by Franks and Cleaver (2007), water governance involves a practical realm of many assimilated parts which perhaps validates a definition derived from the practitioners. While this may be true, the point Franks and Cleaver raise affirms the value of subjecting terms used in academia to critical reflection, analysis, and debate. As such, this research provides an opportunity to engage with the concept of water governance through trying to build more systematic knowledge through academic analysis of factors influencing water governance & SDG 6 achievability (see objective 2 & 3).

In assessing water governance, the mechanisms through which action is accomplished play a significant role. Water governance mechanisms (WGM) can be summarized as the avenues through which decisions in water governance are transformed into outputs and/or actions (see Rogers and Hall, 2003; Franks and Cleaver 2007; Biermann et al 2009). This includes the formal and informal rules, institutions, rule-making systems, and actor-networks that Biermann et al. (2009) highlight in their definition of governance. This further highlights how water governance translates into water management actions through WGMs. For example, the World Water Council is a rule-making system or institution for water governance but is also a network of actors (World Water Council 2016). It is important to also highlight that Biermann et al.'s definition of governance includes the interrelation and integration of multilevel systems. The World Water Council is a prime example of this as well because it encompasses multiple systems and WGMs within its scope. While this may add to the complexity of determining which mechanisms are at play, it aligns with the concepts coming from sustainability, governance, and SES literature; namely that the world has growing interrelations and complexities which need to be accounted for holistically in academic and practical spheres (Wallis and Ison 2011).

There is not a singularly accepted way to assess water governance. However, the literature suggests numerous factors through which to examine and analysis WGMs. In my research, I will investigate factors such as transparency, accountability, salience, and participatory processes as elements of water governance that may enable or hinder SDG 6 achievability as a rigorous way to investigate my research question through my objectives. These four example criteria were chosen through a survey of relevant literature (UNDP 1997; Langley 2001; Conca 2005; Cash et al. 2006; Armitage 2008; Pahl-Wostl, Holtz, Kastens, and Knieper 2010) and represent pieces of a preliminary assessment framework for SDG 6 achievability. Transparency in WGMs can be understood as the degree to which processes and motivations are easily perceived, including such things as self-disclosure reporting, funding sources, and providing open access information (UNDP 1997; Langley 2001). Accountability can be understood to be the degree to which WGMs are held responsible for follow-through on actions or commitments, as well as arising consequences. This can include use of funding and consequences of actions (UNDP 1997; Conca 2005; Armitage 2008). Salience refers to the level of prominence of a WGM; that is the degree to which they influence the water governance landscape on multiscale levels (Cash et al 2006). Participatory processes refer to *how* WGMs are

created, established, or adapted, particularly in institutions and rule-making systems (UNDP 1997; Conca 2005; Pahl-Wostl. Holtz, Kastens, and Knieper 2010).

A key aspect of water governance in general highlights the plurality of values through which collective understandings and objectives are created (Groenfeldt and Schmidt 2013; Rathwell et al 2015). On this, Armitage (2008, p23) provides an example, writing, "In Indonesia, for instance, representations of the 'other' (i.e., marginalized, rural or traditional communities) are often encapsulated in pejorative terminology connected to broader worldviews among the bureaucratic and management elite" which marginalizes some perspectives while making others foundational to the creation of governance paradigms. In the case of SDG 6, because targets were designed to treat the planet holistically and are particularly aimed at sustainable usage and equity concerns, it is important that the voices of the politically powerful are not the only ones informing a collective understanding. Participatory processes also matter because acceptance of WGM's initiatives may depend upon aligning with local or regional values for viability and sustainability (Cash et al 2006; Schmidt and Shrubsole 2013; Rathwell et al 2015). While these represent only four of the possible ways to evaluate WGMs, they highlight the diverse spheres through which water governance operates and show the importance of *how* we critically engage with WGMs.

In India, water governance mechanisms seem to be a reflection of the highly bureaucratic and democratic national structure. First and foremost, water is generally considered a state issue, meaning the national government can only put out recommendations on projects or management, as well as provide funding for water projects (Bansil 2004). This means much of the responsibility for the realization of SDG 6 targets will fall on the Indian states. Furthermore, from the state level downward, a number of government agencies, NGOs, consultants and communities are implicated in the schemes that work implicitly toward SDG 6 targets. Within this system, there is no doubt that progress has been on numerous fronts, including increasing access to safe drinking water and providing sanitation services (Prokopy 2005; UNICEF and WHO 2015). Many small-scale Indian communities have also taken the responsibilities of water governance into their own hands through community-led initiatives (Bakker 2007; Conrad and Hilchey 2011; Wallis, Ison and Samson 2013). Even with this progress, it is unclear whether the mechanisms of governance in India will be able to support the implementation of SDG 6 targets by the 2030 mission's deadline, especially considering the human and environmental implications of universally, equitably, and sustainably meeting the

targets.

It is important to recognize that water governance in India does not operate in isolation, but is in fact influenced by the larger trends and mechanisms in water governance on the international scale. While it is influential and therefore important to discuss, there are far too many entities, forums, and documents that exist internationally which can be considered influential on water governance to explore international water governance comprehensively within the scope of this research. The water governance literature does highlight some broad normative themes and trends about water governance at the international level. From a normative perspective, the water governance literature points particularly to the existence of some action-based norms and some conceptual norms. The IWRM approach is one of the major schools of thought dominating international water governance surrounding action-based norms. This is despite debates over prescriptive management practices in IWRM, among other criticisms (Biswas 2004; Halbe et al 2013; Giordano and Shah 2014). Considering action-based norms, the highlighting of participatory approaches to water management with involvement of communities at the ground-level has become increasingly popular as an ethical and sustainable approach to water management (Rogers and Hall 2003; Neef 2009; Halbe et al 2013; Newig and Koontz 2014). The IWRM paradigm itself also entails quite a few conceptual normative prescriptions. Particularly notable is the focus on collaboration across multiple and sometimes untraditional stakeholders (Watson 2007; du Toit and Pollard 2008). This collaboration extends into the areas of social learning considering knowledge transfer, co-creation, and shared vision (Pahl-Wostl et al. 2008; Pahl-Wostl 2015). The IWRM percept also pushes a rapid transition in developing countries from informal to formal water economies, which has been found to be problematic (Shah and van Koppen 2016). Beyond the IWRM focus, while often there are some legal features to normative pressures where laws reinforce norms and therefore compliance (Boham 1999; Holzinger and Knill 2005), long-standing legal mechanisms play a minimalistic role in the discussion of normative pressures as laws are usually already a reflection of normative features.

The complexity inherent in water governance, its mechanisms, and management is made apparent especially when considering water governance at multiple scales. In relation to SDG 6, this makes assessing the prospects of SDG 6 achievement and ways to enhance achievability more complicated. Pahl-Wostl et al. (2011, 572) highlight the complexity of assessing governance systems, writing, “Finding general patterns to explain success or failure of governance regimes poses considerable challenges. Governance embraces the full complexity of a wide range of processes and

their interaction… A major challenge is to understand how all the different processes characterizing these systems, in concert determine certain policy outcomes under certain structural conditions and how change in governance regimes occurs." Through utilizing appropriate assessment criteria, descriptive dimensions for understanding the systems in which governance is accomplished, and using a multi-level approach, I hope to address and incorporate the complexity needed to create meaningful analysis and recommendations within this water governance-related research for enhancing SDG 6 achievability.

2.3 Social-ecological systems and the human-environment connection

The presence of deep interactions between human and environmental systems is apparent throughout the literature on sustainable development & the SDGs, as well as water governance. A social-ecological systems (SES) perspective can be used as a crosscutting theme, providing a conceptual lens through which to examine water governance and SDG 6 achievability as it pertains to both planetary systems as well as human systems.

A social-ecological system (SES) has been defined and redefined by numerous scholars. The definition presented by Redman et al. (2004, 163) tries to encompass key factors across different definitions. They describe an SES as: (1) "a coherent system of biophysical and social factors that regularly interact in a resilient, sustained manner;" (2) "a system that is defined at several spatial, temporal, and organizational scales, which may be hierarchically linked;" (3) "a set of critical resources (natural, socioeconomic, and cultural) whose flow and use is regulated by a combination of ecological and social systems;" and (4) "a perpetually dynamic, complex system with continuous adaptation (Burch and Deluca 1984; Machlis and others 1997)." From this lengthy definition, the complexity that is synonymous with social-ecological systems is highlighted.

An SES perspective emphasizes the integrated concept of humans in nature and stresses that the delineation between the social and the ecological is artificial and arbitrary (Berkes and Folke 1998; Nayak 2014). The history of SD can be overall contextualized through a growing consensus in the international community that human and environmental systems could no longer be treated separately. The growing complexity that has been noted several times in this chapter is highlighted in SES as the boundary lines between social and ecological systems have become increasingly blurred and as complex feedbacks in social-ecological system become more apparent.

The key features of using an SES perspective that are particularly useful in this research are (1) making social-ecological connections explicit for understanding the problem context; (2) reconsidering relevant scales or units of governance; and (3) better informing management and governance. First and foremost, the SES perspective integrates the social and ecological spheres in a way that shows their interconnection and interdependence. Considering SDG 6 achievability, this means an SES perspective will contribute to a more nuanced understanding of the problem context where social and ecological factors *and* feedbacks between them are considered. For example, human actions may degrade water quality in numerous ways, which can degrade the quality of drinking water, which may then have implications for human health. These interconnections frame the problem of water quality, as well its drivers and thus, the interconnections an SES perspective makes explicit are important for more fully understanding problems. An SES perspective also calls into question what the 'right' unit of governance may be for different problems. Humans tend to use the boundaries of their established institutions to examine problems being experienced within those boundaries, as well as to pursue goals (Locke and Latham 2006). This is problematic for overcoming the problems associated with SDG 6 as many drivers, stressors, factors, stakeholders, and ecological considerations that are relevant to both problems and solutions may lay outside existing institutional boundaries. The SES perspective encourages systems thinking around all the relevant social and ecological components influencing problems and solutions, thus encouraging decision-makers to consider what unit of governance may be most effective or necessary. Finally, an SES perspective leads to better informed management and governance. Building upon the value of SES to (1) problem context and (2) scale, these connect to what kind of information is being considered throughout governance processes. With the more holistic understanding of an issue that an SES perspective brings, managers can make better decisions and avoid problem-shifting. Olsson, Folke and Berkes (2004, p77) write on this, "Schindler (1998) claims that experiments at less than ecosystem scales are inappropriate and may even cause erroneous management decisions. They seldom provide insights on the dynamics of ecosystems or connect temporal and spatial scales and they tend to avoid the issue of uncertainty…" An SES perspective demands that ecological considerations and feedbacks are incorporated with the social, translating to better information on the structure and state of the system, associated problems, and potential solutions.

Particular to SDG 6, the goal clearly embeds an SES perspective through recognizing the importance of human and environmental consideration for overall sustainability within its targets (see

Appendix A). This can be seen in contrasting targets 6.1 (drinking water for all) and 6.6 (protect and restore water-related ecosystems) as target 6.1 mainly concerns human systems and target 6.6 involves environmental systems. Target 6.4 (water-use efficiency) further exemplifies this through the way human and environmental concerns are integrated within it. To further support the importance of this, the Redman et al (2004) definition of SES was chosen because it encompasses the diverse social-ecological contexts within which the SDGs are applied and includes how scale can determine different interactions in and between SES.

In the context of this research, an SES perspective has important implications for how we interpret and analyze water-related issues, as well as for how we can craft innovative governance solutions (Armitage 2009; Plummer et al. 2013; Biermann 2014). First, water is an exemplary vessel through which we can see the integration of and interconnection between both social and ecological systems. Water is a requisite for life on Earth and makes no exception amongst social or ecological systems. Considering water governance, it is obvious that humans have a significant amount of power to alter environmental landscapes over relatively short temporal periods (Smith and Zeder 2013; de Loë and Patterson 2017). This is supported further in the era of the *Anthropocene* where humans are now the most defining factor of environmental change (Biermann 2014). This has pronounced implications for the ways in which we conceptualize interactions in social-ecological systems for governance outcomes. The use of adaptive co-management as a governance solution is exemplary of this, as ACM orients itself around the values of both social and ecological systems, as well as monitoring and adapting to their complex interactions (Armitage, Berkes and Doubleday 2007; Halbe et al. 2013).

Considering the prominence of governance-based solutions within the social systems in particular, it is important to recognize the role power can play in relation to environmental resources. In the academic world, power is not often taken into account in analyses of social-ecological systems. Nayak, Armitage, and Andrachuk (2016, p326) highlight this saying, “Scholarship on regime shifts is largely driven by insights from the biological and ecological sciences, and suggestions for management reflect a largely technocratic and instrumental view.” This underscores the importance in connecting management practice to social realities like power imbalances which may affect the viability or practicality of certain solutions. Beyond the overall implications of power in addressing problems connected to environmental resources, it is also important to understand that different types

and definitions of power exist. These are explored by numerous scholars, but in relation to water governance and collaboration, Brisbois and de Loë (2016) highlight three dimensions of power: instrumental power, structural power, and discursive power. The value of critically engaging with the concept of power in water and social-ecological contexts is affirmed by scholars, but they also note that there is not a singular correct way in which to do so (Nayak, Armitage, and Andrachuk 2016; Brisbois and de Loë 2016). Within the context of this research, power will most closely engage with structural power as it highlights issues connected to agenda-setting, decision-making, involvement of actors, and the constraints of socio-economic-political paradigms explored later in Chapter 4 (Brisbois and de Loë 2016). Overall though, this work will largely focus on incorporating diverse reflections on power rather than focusing on one specific dimension of power. This is done in hopes of highlighting the multi-dimensionality of power in water governance and the need for more explicit engagement with 'power' as achievement of SDG 6 is pursued in India.

To summarize, in noting the ways in which social systems negatively impact ecological systems, the feedbacks or consequences of human actions become apparent. These impacts and feedbacks demonstrate the value of governance that uses an SES perspective and accounts for complexity (Smit et al. 2001; Olsson, Folke and Berkes 2004), particularly for the governance of water (Huitema et al. 2009; Halbe et al. 2013; de Loë and Patterson 2017). This includes an engagement with the social dimensions of power dynamics in water governance processes. Through employing an SES lens, human and environmental dependence, interconnections, and complexities are explicitly recognized and incorporated. This helps contextualize current paradigms in water governance, which impact SDG 6 achievability. An SES perspective will contribute to achieving my research objectives through providing a deeper understanding of water governance systems (Objective 1), gathering relevant data (Objective 2), and SDG 6 achievability in India (Objective 3), through embracing the SES complexity and interconnection apparent in SD, the SDGS, and water governance.

2.4 Conceptual framework

Figure 2.1 is a conceptualization of how best to approach my research purpose and objectives as derived from the literature review. Within the boundaries of a guiding social-ecological systems perspective, SDG 6 achievability can be explored through many lenses or indicators. In Figure 1.1,

the component parts of the conceptual framework (from top to bottom) are: SDG 6 achievement, the SDG 6 targets, water governance mechanisms (WGMs), potential assessment criteria, and underlying water governance structures. Potential interactions or feedbacks are represented as blue arrows, notably between water governance, WGMs, the assessment criteria, and SDG 6 targets.

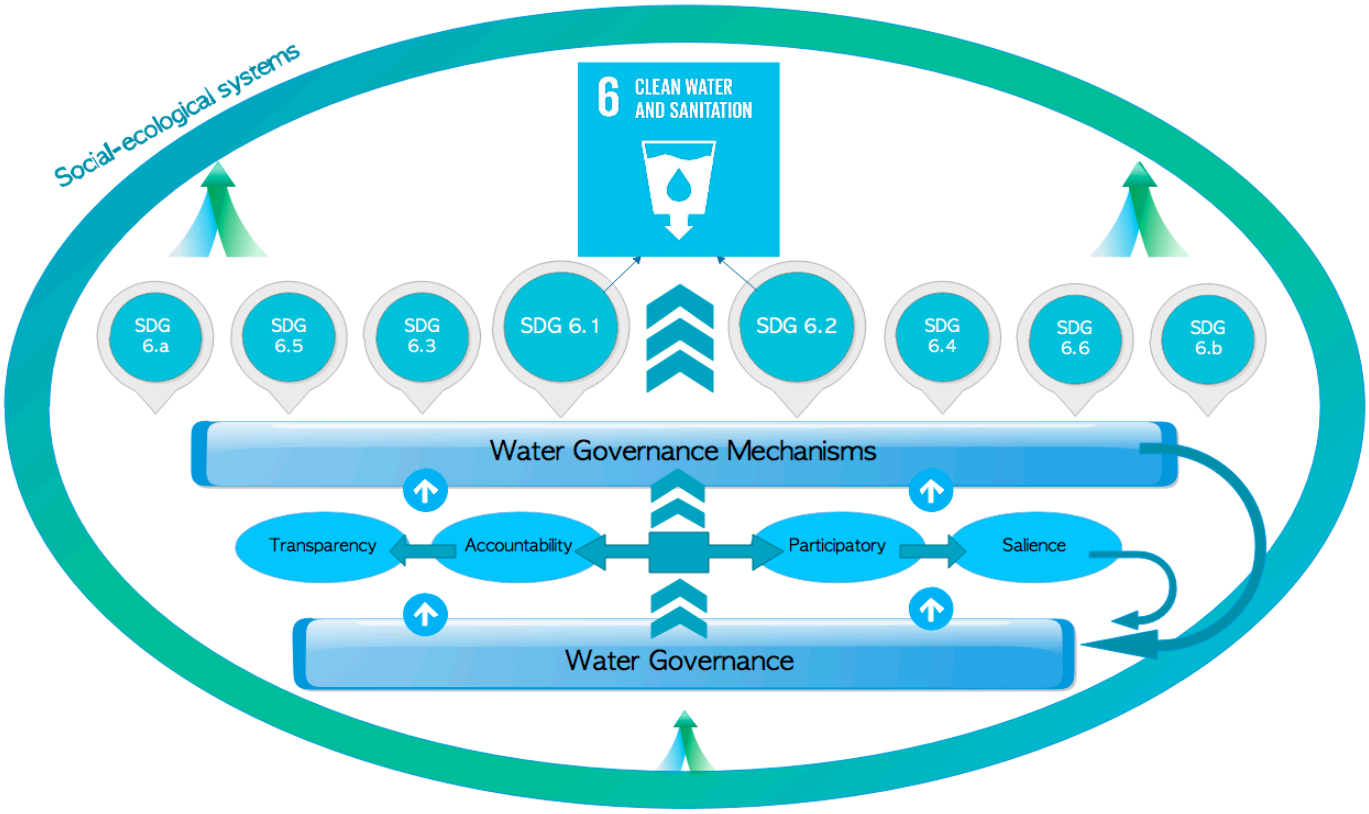


Figure 2.1 – Conceptual framework for investigating enhancement of SDG 6 achievement

Pertaining to objective 1, the water governance system and mechanisms in India will be defined as to better situate the current state of water governance within my research. This is represented in the conceptual framework (CF) through the 'water governance' and 'water governance mechanisms' boxes which will be investigated in Chapter 4. Four criteria for water governance (transparency, accountability, participatory, salience) are placed in circles between the two 'water governance' and 'water governance mechanisms' boxes to highlight that many factors may influence how water governance mechanisms work (or do not) toward the SDG 6 targets. Transparency (UNDP 1997; Langley 2001) and accountability (UNDP 1997; Conca 2005; Armitage 2008) have been highlighted as important factors affecting water outcomes in concept and practice. Participatory

practices have also been highlighted as important to the success and sustainability of water projects, including through IWRM and the SDG 16 (UNDP 1997; GWP 2000; Conca 2005; Engle et al. 2011; Fabricius and Currie 2015). Salience was chosen because the literature shows that the influence, power, or prominence of water governance mechanisms are influential in creating lasting change (Cash et al. 2006). These are partially investigated in Chapter 4 and further reflected upon in Chapter 5.

For objective 2, the many blue arrows represent my focal areas of investigation. These are the interactions happening amongst the component parts SDG 6, WGMs, and water governance, as well as the extent to which different factors (such as transparency, accountability, participatory processes and salience) may affect SDG 6 achievability, both positively and negatively. This is described in Chapter 5.

Considering objective 3, the information around water governance, WGMs, criteria, and feedbacks will be used to analyze SDG 6 achievability in relation to my case study. This and the literature enables me to note themes and create recommendations for ways in which water governance and its mechanisms could further enhance SDG 6 achievability in India, detailed in Chapters 5, 6, and 7.

Overall, the individual SDG 6 targets and the blue-green arrows are used to reaffirm the scope and boundaries of this project. My research will focus on SDG 6 targets 6.1 & 6.2 primarily, with the focus on sustainable and equitable access to clean drinking water and sanitation services. There are national level plans in India, like the Rajiv Gandhi National Drinking Water Mission, that operate on the philosophy that drinking water and sanitation must be addressed in unison (MDWS 2013). While targets 6.1 & 6.2 are meant to be the focal points of inquiry, the interconnections between the targets of SDG 6 should also be recognized and accounted for. As clean drinking water and sanitation may be deeply connected to or dependent on other targets, this study may also incorporate elements of other targets, including but not limited to targets 6.3, 6.5, 6.6, 6.a, and 6.b. For example, target 6.3 – improving water quality – address problems like pollution and untreated wastewater, which can impact drinking water sources through contamination of ground and surface water. As such, it may be necessary to consider or incorporate elements of other targets in order to address the realities of the water governance landscape of the case study country and state.

This chapter covered the literary foundation and conceptual direction of this research. The three literature areas – SD & the SDGs, water governance, and social-ecological systems – lay the foundation and informs this inquiry into water governance and SDG achievability in India. The conceptual framework helps integrate learnings from the literature into a practical approach to addressing the three objectives of this research. The next chapter will explore the methodology and methods through which this research was conducted.

CHAPTER 3
Methods

3.1 Introduction

SDG 6 seeks to ensure universal access to clean water and sanitation, but it is unclear if pre-existing institutions and policies will be able to achieve this. In order to better understand how decision-makers and practitioners in water governance can help achieve SDG 6, I used a country-case study in India with qualitative research methods (interviews and focus groups) to better understand the current water governance landscape in India, as well as avenues to better move toward achieving SDG 6. More specifically, I hope to capture what has worked (enabling factors) and what has not (hinder factors) in order to make recommendations on how we can achieve a more 'sustainable water future' through the shared SDG 6 vision on local, regional, and national scales. This took place over 4 methodological phases.

3.2 Methodology and Methods

The methodology and methods I outline below provided a means to investigate the operational goals and the practical realities of water governance in relation to the achievability of SDG 6 in India. The use of three scales gave structure to this investigation: macro (national-international), meso (state-interstate-regional), and micro (panchayat-community) levels. A discussion of my personal experiences in the field follows the discussion of the methodology.

Overall, while I describe the following steps as though they were executed in a chronological fashion, data collection, coding, analysis, and triangulation were conducted in an iterative process, rather than in a linear manner. This allowed for efficiency of analysis and the ability to collect more thorough data, learning from previous interviews and furthering investigation (Wheeldon and Faubert 2009). All relevant materials concerning the ethics clearance of this research can be found appended to this document (Appendix B-D).

3.2.1 Methodology

This section will detail the philosophical and positional aspects which contextualize this research through looking at the methodology, philosophies and worldviews involved, reflexivity and researcher positionality, and some personal reflections.

3.2.1.1 Methodology

The methodology of research is reflective of the philosophies under-pinning a research project, including the choices behind the design of the research itself and the positionality of the researcher. The methodology involved a qualitative case-study approach with some elements of participation.

The research design used a qualitative approach, characterized by the use of observation, interpretation, and the generalization of theory (Creswell 2014). More specifically, the use of a case-study methodology gave shape to this research. A qualitative case-study approach is defined by Creswell (2014, p97) as "a qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information… and reports a case description and case themes." The qualitative approach is also generally characterized by a more flexible and iterative structure in design, data collection, and analysis than positivist approaches (Alessandrini 2012; Creswell 2014).

The benefits of using a case study methodology in this research are numerous. First, case studies bring the researcher intimately close to the phenomenon under investigation. In this case, examining the water governance mechanisms at play in India at the ground-level created a close look at factors enabling and hindering SDG 6 achievability in a localized context. This can be summarized as the use of an instrumental case to better understand the phenomenon under investigation (Stake 1995). Additionally, case studies allow for specificity and depth of understanding within the case study contexts (Creswell 2013). In this work, the qualitative case studies used both observations and data from semi-structured interviews & focus groups to guide findings, which reduces or exposes biases, for example reflecting on when researcher observations and participant information do not match (Yin 2009). Other specific benefits of a case study methodology included the ability to interact with community members. This allowed the voices of those who are affected by high-level water governance at the ground-level to be heard, illuminating the realities of SDG 6 achievability on the ground.

The qualitative case study methodology does have tradeoffs to consider though. Because I use multiple case studies, this can "dilute the overall analysis," translating to less depth than might be captured if only using one case (Creswell 2013). Additionally, the researcher is responsible for defining the boundaries of the case study, which may lead to further tradeoffs between specificity and

generalizability (Creswell 2013). While these shortcomings are certainly important to recognize, for this research, the benefits of a qualitative case-study methodology best aligned with the research objectives, as well as responded to the calls for further case study-based research in the water governance literature (Mollinga et al 2007; Farrelly and Brown 2011; Halbe et al. 2013).

Elements of participation also gave shape to the methodology of this research. First, participation can be considered an inherent part of a qualitative approach. Creswell (2014, p234) writes, "In the entire qualitative research process, the researcher keeps a focus on learning the meaning that the participants hold about the problem or issue, not the meaning that the researchers bring to the research or that writers express in the literature." This parallels the use of learning from participants' meanings in Objectives 2 and 3 of this research. Additionally, this research sought to incorporate participants' knowledge, opinions, and experiences through participatory activities like informal meetings, focus groups, and triangulation. This enabled participants' experiences, meanings, and values to be further incorporated and be central to the investigation of water governance and enhancing SDG 6 achievability. Benefits of using participatory elements for the participants can be developing abilities to critically reflect on issues in their community, as well as an increased sense of efficacy over taking action (Cancian 1996, 191). The benefits for the case study itself included providing a more nuanced understanding of the case, as well as making power structures more overt, while challenges in general may include a superficial use of participation (Cancian 1996). The benefits of using participatory elements outweighs the shortcomings because this research draws upon participant experiences with and knowledge of water governance and management.

3.2.1.2 Worldviews

Considering the philosophical worldviews that underpin this study, I chose an approach that goes beyond positivism, but drew from many other scientific paradigms. Creswell (2014) discusses four worldviews that a researcher may draw from, namely post-positivist, constructivist, pragmatist, and transformative worldviews. While this is not a comprehensive of all worldviews which may inform research, they are some of the most widely discussed (Creswell 2014). Drawing from these, I particularly drew from pragmatist and transformative scientific paradigms in my research, with the accompanying elements of participation explored above. Pragmatism is characterized by a focus on understanding real-world problems (Rossman and Wilson 1985) and being centrally concerned with applications or what works in or to determine suitable solutions to problems (Patton 1990). Because this research engages with the practical, problem-centered questions about how to enhance the

achievability of SDG 6 in policy and practice, the pragmatist worldview that drives inquiry is evident. The transformative worldview is really more of an umbrella term (Mertens 2009), but Creswell (2014, 38) identifies justice-oriented inquiry, incorporating power dynamics, and agendas for change as characterizing this worldview, with further possibilities for individual and institutional change. This research incorporates the transformative paradigm through allowing marginalized voices (women, poor, different castes) to be heard through representation in the data, overtly investigating power dynamics in water governance in India, and synthesizing findings into recommendations for change through enhancing SDG 6 achievability. Overall, the philosophy behind my research identifies most closely with the pragmatist and transformative worldviews as best suited to investigate water governance and SDG 6 achievability in India.

3.2.1.3 Reflexivity and Positionality

Reflexivity and positionality are important topics to discuss, especially when a researcher is conducting research in a different socio-cultural context from their own background. This serves the purpose of employing critical reflection throughout the entire research process. When assessing rigor and objectivity, it also serves the purpose of exposing and exploring a researcher's own subjectivity, therefore contextualizing the processes and conclusions of a research project.

Reflexivity can be summarized as evaluating and reflecting upon your own position within research and the production of knowledge (Reed and McIlveen 2006). For me, this manifests as critically reflecting on my own identity and how that may influence the decisions I make. This further prepares me to learn from these reflections and thus shapes future actions, choices, and the development of identity. Concerning knowledge generation, this manifests as reflecting on how knowledge is being generated and further on the analytical processes through which I myself am generating knowledge. This also encompasses explicitly recognizing the power relations which are at play. Commitment to reflexivity in my research can be observed through my effort to be iterative and flexible in my approach, learning along the way from the valuable knowledge and views of participants as well as that context of India.

Part of reflexivity then is also reflecting upon my positionality and identity as a researcher. My background is foundationally under-pinned by being a white female, born and raised in California, USA. My educational background has incorporated some studies on South Asian history

and politics and my practical experiences have included working in a few different developing nations. This gave me the benefit of understanding some contextual pieces of India, but it is important to recognize I had no practical experience with the Indian context prior to this research and that as a foreigner, I cannot truly approach knowing the Indian experience in its many forms. My position as a westerner in India invoked some inherent power differentials, especially considering the colonial history in India. In a few minor instances, people connected me with the past oppressive regimes experienced in India and identified me as privileged beyond capability of understanding local contexts. In the overwhelming majority of cases, my position as a westerner made me intriguing to people and resulted in an overall experience of people wanting to connect with me and to participate in my research. This was extremely helpful in breaking down some barriers that I suspect may have made my fieldwork more difficult to execute if people had not been as interested in me personally.

Considering matters of reflexivity and positionality, Tuhiwai Smith (1999) highlights the irony of discussing these topics in research, as even the notion of modern scientific research is deeply rooted in the tradition of western philosophical thought. This is made even more grave with the contexts of historical colonialism and imperialism, as well as current neocolonialism, especially on a personal level working in the Indian context. Throughout this thesis, I attempt to unpack matters of positionality and explain the processes I went through regarding reflexivity in research practice, as well as reiterating positionality issues as they arose. This is done to be sensitive to the fact I conducted research in a geographic region and socio-cultural-political context that was previously foreign to me.

3.2.1.4 Personal Reflections

While it is impossible to completely unpack everything that relates to my history and the worldview I bring to this research as an individual, it is still valuable to touch upon some personal reflections on my experience, especially in the field. This is valuable as working as a researcher in a completely different socio-cultural, political and resource context comes with its own set of rewards, trials, tribulations, and experiences.

Working in India was extremely rewarding to me personally and directly benefitted my research. First and foremost, my experiences working with ATREE in Bangalore as my host institution was particularly formative in my fieldwork. I benefitted immensely from the support I

received at ATREE where I developed a network for academic and personal needs. Academically, my ATREE network helped me narrow down my field sites, develop a network of contacts to possibly interview, connect with people for field assistance, and scope what was realistic to do within my time frame. Personally, my time living with Indian students and researchers added an additional level of cultural immersion and allowed me to explore the commonalities and differences between our worldviews. This allowed me to overall be more appreciative of our commonalities and understanding of our differences.

While my experience in India was generally positive, there were many moments where social, cultural, political, and language-based differences created hard situations. Within the context of my research, these moments included subjects like gender norms, translation, power differentials, ethical procedures, research design, and logistics. I was able to navigate these with the support of my friends, colleagues, and supervisor. Each moment of hardship was a learning opportunity and gave deeper contextual meaning to my research.

Overall, the context-sensitivity and personal growth that came out of this research would not have been possible without my time in the field. It has additionally opened other doors for me through my extended network of water and ecology researchers and practitioners across India. I will be forever grateful for my fieldwork experiences and the lessons learned I now carry with me.

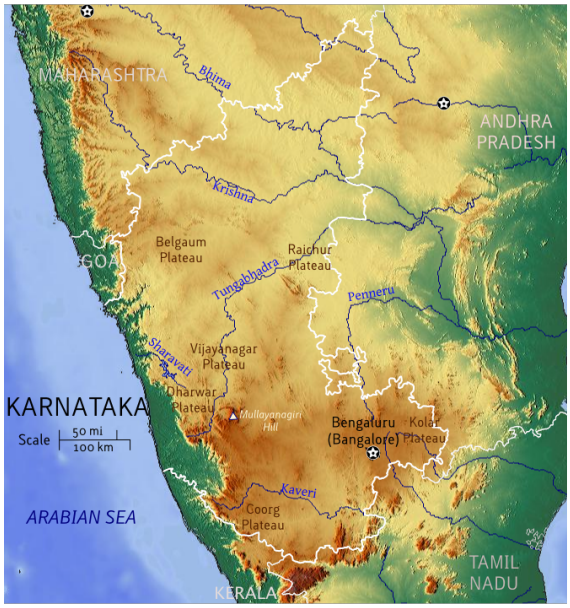
3.2.2 Methods

The methods employed in this study were semi-structured interviews and focus groups. These were conducted within two community case studies (micro-level), as well as with non-community participants in meso- and macro-level participant groups. This section presents relevant information on the case studies, including a general background and a more detailed look at each case study site, succeeded by a small section on the non-community participants. Presentation of the semi-structured interview, focus group, sampling, scoping, and analysis methods follow.

3.2.2.1 Case Study Background – Community Participants

Engagement with activities and outcomes connected to SDG 6 was important in this research, but water governance and its mechanisms consist largely of abstract decision-making and policy-setting, which can be difficult to study in relation to the tangible outcomes of SDG 6. In order to

engage more tangibly with the effectiveness of water governance mechanisms for SDG 6 achievability, I chose two water projects to use as micro-level case studies. In these case studies, I followed through their perceptions of governance challenges, successes, and effectiveness in water provisioning in their own communities. These micro-case studies were designed and employed as two qualitative instrumental case study (see Methodology). In order to better understand SDG 6 achievability, a conventional state-implemented water project and an experimental, federally-funded pilot project aimed at SDG 6 targets in the Indian state of Karnataka were chosen. These water project or initiatives were not directly linked to SDG 6 but in verbiage, they both encompassed SDG 6 targets 6.1 and 6.2 in their project missions.



Map of Karnataka
Source: https://maps-for-free.com/

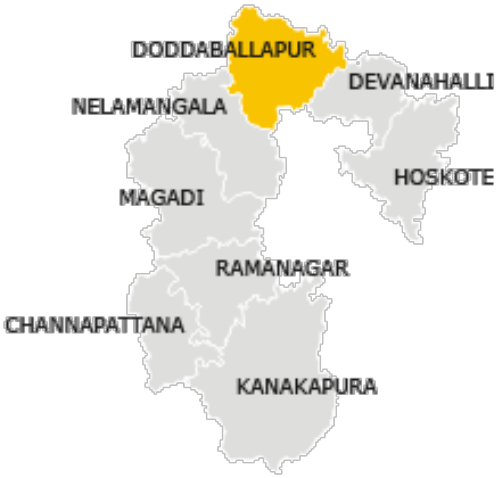
Micro-level interviews and focus groups within these case studies were conducted within the Indian state of Karnataka. Socially and economically, Karnataka houses some of the richest and the poorest citizens of India, especially considering the capital – Bangalore – is home to the country's booming tech industry while the north of Karnataka is home to some of the poorest districts in India (Bose 2003). Karnataka has an interestingly diverse hydrologic landscape which affects water security differently depending on regional differences considering factors like hydrology, population, livelihoods, presence of industry, and intensity of agriculture. Therefore, water quantity, quality, and accessibility varies greatly across the state. Historically, Karnataka has been considered a water scarce state (Bandyopadhyay 1987; Postel 1992; Sadashivaiah et al 2008) and climatic patterns have trended toward rising temperatures and lessening precipitation in recent years within the state (Gleick, 1993; Rajendran et al 2012).

Additionally, it is important to note that in Karnataka, water has been a politically contentious issue for some decades, within the state itself and amongst neighboring states. During the course of my research, there were numerous 'bundhs' or strikes surrounding water (Gleick et al 2009). Shortly

after the completion of my fieldwork ended in August 2016, there was a series of protests in September 2016 following a Supreme Court ruling ordering Karnataka to share more water with the neighboring state of Tamil Nadu (Najar 2016). As such, engagement with SDG 6 targets will play an important role for the water landscape in Karnataka politically, socially, and environmentally. As SDG 6 is meant to tackle a broad range of issues pertaining to water security, its application would very likely benefit Karnataka's people and ecosystems.

3.2.2.1.1 Case Study – Doddaballapura Taluk, Thirumagondanahalli Village

The case study that used the conventional, state-implemented water project was carried out in Thirumagondanaghalli village in the Doddballapura Taluk. Doddaballapura is a block panchayat in the Bangalore Rural District of Karnataka situated an hour north-west of the urban center, encompassing four sub-districts and seven gram panchayats. Doddaballapura is home to a diverse range of inhabitants, including people from many different socio-economic classes and castes. This means inhabitants of Doddaballapura also have a range of livelihoods, including but not limited to agriculture, business, and teaching, as well as positions in politics and the bureaucracy. There is a general concentration of livelihoods tied to agriculture in full or in part. Additionally, there's a presence of primary resource extraction, particularly sand mining, that is visible within the community, but not openly discussed.



Map of Doddaballapura Taluk
Source: http://survey.ninasam.org/bangalore-rural/doddaballapura/

It is also important to note that Doddaballapura has been transforming because of its proximity to the urban center, including demographic shifts as inhabitants pursue economic opportunities in the city, as well as the pressure of urban sprawl. Urban sprawl has led to visible encroachment from development, the transformation of agricultural land into different kinds of building projects, and a general movement from a sense of isolation from Bangalore Urban District to a sense of co-dependence, among other pressures.

With regard to water resources, Doddaballapura is interesting for numerous reasons. Doddaballapura is mostly dependent on ground water, as surface water is not present in the area and is minimally present in surrounding areas. Additionally, the town does experience pressure from its proximity to the urban center of Bangalore, citing a general trend toward the lowering of the ground water table, the failing of numerous bore wells, and inconsistent qualities and quantities of water over time. According to government records and academic analysis, they are noted as a 'water-scarce' area (Lele et al 2013). Because water is an important issue in Doddaballapura, it is also highly politicized. This is further heightened by the rhetoric and realities of water stress in Bangalore through creating fear of water scarcity from overuse.

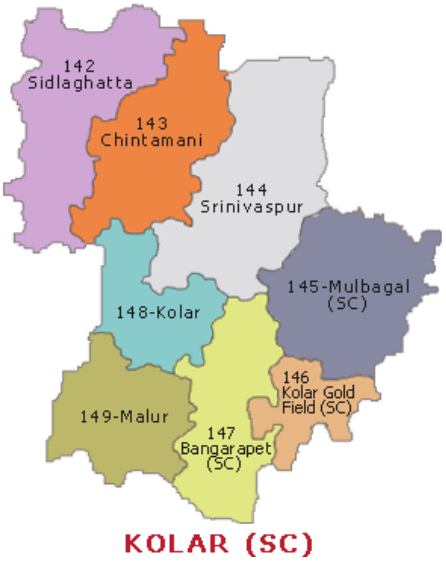
Thirumagondanahalli was chosen as a study location for site observations, semi-structured interviews, and focus groups for two reasons: (1) it is loosely representative of the diverse socio-economic groups across Doddaballapura and (2) it received a small-scale water infrastructure project from the national and state governments under the National Rural Drinking Water Program (NRDWP). The NRDWP is a central government program that provides funding for bore wells or other improved water infrastructure, ultimately implemented through state and panchayat mechanisms (NRDWP 2010). While the guiding document for the implementation of the NRDWP highlights the need for participation of communities (NRDWP 2010), within Thirumagondanahalli, there were negligible to very minimal levels of participation from people outside of panchayat positions. This suggests that in practice, NRDWP implementation may not actually utilize the aforementioned participatory techniques. These two factors made Thirumagondanahalli ideal to study my research question because sampling was able to capture perceptions from a range of participants and the presence of a specific water project with physical infrastructure in the village created a structured opportunity to explore water governance with non-experts.

All participants were from or lived in the Doddaballapura taluk, but the majority of them specifically lived in Thirumagondanahalli village. All participants who did not live in Thirumagondanahalli were directly connected to the administration of water projects implemented in the village and specifically were involved in the NRDWP project mainly through being elected officials or bureaucrats within the Panchayati Raj system. This was used to guide semi-structured interview questions.

3.2.2.1.2 Case Study – Mulbagal Taluk

The case study detailing the more experimental, federally-funded pilot project for water security was carried out in Mulbagal Taluk. Mulbagal is a block panchayat in the rural Kolar District of Karnataka and encompasses several gram panchayats within the block.

Mulbagal block has many similarities with Doddaballapura, including diverse socio-economic backgrounds, livelihoods, and castes. There is also a general focus on agriculture, including sericulture and the presence of primary resources extraction, particularly shale mining. Considering water resources, groundwater is the main source of water for all uses. Mulbagal has also been identified by the government as a water scarce block.



Map of Kolar District
Source:
http://www.snipview.com/q/Kolar_(Lok_Sabha_constituency)?alt=Kolar_(lok_sabha_constituency)

There are a few notable differences between Mulbagal and Doddaballapura. First and foremost, the geographic locations mean there are differences in the cultural, hydrologic, and demographic realities. Mulbagal is located outside the direct reach of the Bangalore urban center and therefore does not experience the same kind of pressures from urban sprawl. Also of note is that the state of Mulbagal's water scarcity is perceived as graver than the situation in Doddaballapura, with Mulbagal being labeled an 'severely overexploited block' (Singh 2016).

Because Mulbagal block was identified as one of the most overexploited blocks for water resources in the country, Mulbagal was chosen in 2012 to be one of ten blocks across India for a pilot project surrounding water security, budgeting, and planning under the National Drinking Water Security Pilot Project (NDWSPP). In Mulbagal, this project was implemented through a local NGO partner, AFPRO, whose cooperation was imperative in the successful execution of semi-structured interviews within this community. This project was a pilot project sanctioned by the national government of India under the Ministry of Drinking Water and Sanitation (MDWS) and implementation took place over three years. The NDWSPP included aspects of participation and capacity building and the project had four-pronged approach which guided implementation: (1)

source sustainability, (2) system sustainability, (3) sustainable sanitation, and (4) institutional sustainability (Ministry of Drinking Water & Sanitation n.d.). Source sustainability pertained to water resource access, consumption, and status, including water budgeting techniques and monitoring or water levels. System sustainability encompassed infrastructural aspects of water security including access-points for clean water, tools for monitoring, groundwater infiltration areas, and irrigation improvements. Sustainable sanitation focused on coupling the push for water security with ending open defecation through ensuring household and public toilet facilities, as well as educating the populace on the threats open defecation poses to water resources. Institutional sustainability included the participatory aspects of making water security plans with the communities, utilizing Gram Panchayats for the oversight and management of water security locally, training in IWRM-based practices, and the creation of Village Water and Sanitation Committees (VWSCs) for financial and long-term guidance on issues pertaining to water security within the community. Though not required by the NDWSPP guidelines, in Mulbagal the implementing NGO – AFPRO – additionally utilized community mobilizers to further the impact of participatory processes by hiring, training, and empowering local community members as liaisons for the three-year pilot project.

All participants lived within Mulbagal block and all were associated with the Water Security Pilot Project in some capacity. Because the NDWSPP targeted the entire block of Mulbagal, it involved numerous gram panchayats. Therefore, semi-structured interview participants did not live within a single village or GP, but rather were inhabitants of numerous different GPs across Mulbagal block. Participants were mainly inhabitants who had participated in the NDWSPP in the capacity of being elected officials, but also included community mobilizers and some community members who had participated in trainings associated with the implementation of the NDWSPP.

3.2.2.2 Non-community Participant Groups

Non-community participants were key informants involved in other levels of water governance in India. These perspectives captured local, regional, and national level insights from the expertise and experiences of non-community participants, including NGO workers, researchers, project funders, policy makers, and government officials. As context matters when researching water governance, non-community perspectives brought other spatial, temporal, and sectoral considerations, overall enabling this research to move beyond micro-level analysis and engage with the larger context of water governance in India. Originally, this non-community group of interviewees was considered

as one group, but during the analysis of data was further broken down into the two meso-level and macro-level sub-groups.

While these meso and macro participants are denoted jointly as 'non-community participants,' it is important to highlight that personal and professional experience has brought many, if not all, participants into contact with communities and ground-level contexts. In their personal lives, this manifested through reflections on access to water and sanitation, as well as human-environment connections around water in their childhood homes. Considering professional capacities, many 'non-community' individuals have worked extensively with community education, empowerment, and capacity-building initiatives. Therefore, the verbiage of 'non-community participants' should not be confused with a disconnection from understanding community or micro-level contexts.

3.2.2.3 Semi-Structured Interviews

Semi-structured interviews were used in India to gain a richer understanding of: 1) what current water governance mechanisms are important to or at use in India (i.e. regional institutions, governing agencies, informal mechanisms); 2) which stakeholders are involved in or impact water governance, as well as the power dynamics amongst stakeholders; 3) their experiences of success and failure in water provisioning projects related to SDG 6 targets; and 4) how the environment is considered in or impacted by these processes. These categories which closely relate to the objectives of this research enabled interviews to provide important insights into SDG 6 achievability (see Appendix C & D for semi-structured interview guides).

Water invokes diverse groups of stakeholders that interact in the context of social and ecological systems. Interviewees included relevant government officials, water professionals, NGO workers, researchers, and inhabitants of the case study communities. Interview locations varied based on the stakeholder group. Some interviews (i.e. organizations, NGOs) took place at office locations and the organizations' buildings. Rural inhabitants were interviewed in their communities, usually in their homes, but occasionally in alternative locations like their farm fields or businesses. Alternate locations for interviews were arranged as requested/needed where both participants and myself felt comfortable. Because I cannot speak any of the regional dialects fluently, my community research assistant was integral in his facilitation of translations and communication when I was unable to

conduct the interview in English, as well as when English was determined to be situationally inappropriate (i.e. cultural sensitivity). Interviews were recorded on a voice recorder based on individual permissions. A total of 29 interviews were conducted to capture the multi-level perspectives involved. There were broadly 6 areas of questions asked during the interview which are categorized under the following themes: 1) connection to water governance / project; 2) power dynamics; 3) water governance mechanisms and their roles; 4) factors of success and failure in clean water projects; 5) social-ecological systems; and 6) suggestions. Questions were adjusted slightly for participants' contexts (generalized as community members and non-community members) as necessary. In total, 18 interviews were done with community members and 11 interviews were done with non-community members, either as experts in their water-related fields or water practitioners.

Interviews with community members were intended to be conducted as individual interviews, but it became clear in the field that household interviews were more appropriate for this cultural context. During my first interview, my field assistant and I were in the home of the participant and the spouse of the participant was wondering in and out of the room, providing comments occasionally on their perspective of interview questions. When interviews were conducted in more visible spaces, like in farm fields or businesses, family members would often gather, interested in what was happening. While many people were just observers, some wanted to express their opinions occasionally as well, especially if someone thought the interviewee had left out important information or details. This meant small pieces of others' perspectives were captured in interviews as well. This led to adopting household interviews instead of individual interviews.

While the community member interviews were ultimately conducted as household interviews, there were clearly main participants and peripheral participants. These are noted in the transcriptions as 'P' for the main participant and 'HHM' or 'Household member' for peripheral participants. It was also clear that male voices tended to dominate the conversation at times. While this was acceptable when the main participant was a male, it was obstructive when the main participant was intended to be a female in the household. During these instances, male household members often jumped to give answers to my questions. I would request my field assistant redirect questions specifically to the woman chosen as a main participant and to communicate the value of having her perspective as a woman. I would also ask my field assistant to remind the male household members that these questions were intended for the woman, though we did value their opinion too. Often times, my

research field assistant would remind male household members that the questions were intended for the woman without prompting as a result of the training we did earlier. Sometimes when I question was answered by a male household member already, I would have to insist my field assistant ask the question again to the intended main participant in order to make sure that was the answer she would give as well. Often times, the woman participant would repeat the same answer, but often they would have different perspectives to provide as well which reaffirmed the value of having the main participant answer all the questions themselves.

Non-community members' perspectives largely gave insights in the form of conceptual observations, personal anecdotes, professional experiences, and relating their own research findings. These interviews were exclusively with individuals. While most interviews were conducted in person, some were conducted via Skype in order to speak with integral knowledge holders who were not located in an easily-assessable area. As noted above in section 3.2.2.2, interviews from non-community members were further categorized into 'meso-level' or 'macro-level' participant groups based on the subject matter discussed during their interviews. Meso-level participants were those that offered perspectives ranging to the state level and macro-level participants were those that offered perspectives also on inter-state, national, and international levels.

A specific effort was made within and across community and non-community groups to have equal or comparable participation from men and women. This was done in order to capture both men's and women's perspectives, as different socio-cultural contexts often impact men and women differently and therefore inform their experiences differently (Meinzen-Dick and Zwarteveen 1998). Additionally, it is well known within the world of water in India that women bear heavier burdens in relation to the collection, distribution, and execution of tasks for which water is used (Desai 1994; Ray 2007). I wanted to honor the fact that women are often the ones closest to water in its applications and make sure that women's experiences were captured in a comparable number to that of men. Because men are generally more visible in Indian society, especially within decision-making and management roles (Meinzen-Dick and Zwarteveen 1998; Zwarteveen 2008), sometimes women participants were harder to find. While extra effort went into identifying potential female participants, by interviewing equal amounts of men and women, I created space for the experiences of both sexes to be captured in comparable numbers in this study.

3.2.2.4 Focus Groups

Focus groups were useful for this research in recognizing that there is a core population or sample that the research is focused on (those involved in or impacted by water governance in India). Focus groups also helped to overcome biases of individual opinions and created a more robust view of factors contributing to or hindering the effectiveness of water governance mechanisms in achieving SDG 6 by allowing for discourse between participants. For example, focus groups facilitated the numerous levels of stakeholders to share knowledge and perspectives on the state of water governance, the successfulness of different mechanisms, and the obstacles present, but also to engage in discourse over individual opinions, points of dissent, or areas that might need further discourse.

Two focus groups were conducted during the course of this research – one with the community stakeholders and another with the non-community stakeholders. As explored above, the different categories of participants contributed to different research objectives. This was also true for the different focus group participants (i.e. certain stakeholder groups, multi-level, etc.). While many focus group participants consisted of semi-structured interview participants, new participants with relevant perspectives or experiences were also involved in order to both refine opinions expressed earlier while creating space for new voices to communicate their perspective.

The community member focus group discussion was conducted in the home of a local women's group leader in Thirumagondanahalli with ten female participants. This was done purposefully as preliminary trends from the semi-structured interviews, as well as numerous other academic papers, suggested the female experience is tied more directly with water governance outcomes on the ground-level (Singh 2006; Franks and Cleaver 2007). Additionally, while I tried to include an equal amount of female and male participants from the community level in my semi-structured interviews, it was more challenging to find women willing to share individually, though they were open to sharing in a group forum with other women. I therefore decided an FGD at the community level with just women would be beneficial to bolster the volume of experiences captured from female perspectives. My research field assistant facilitated translations and communication during this all-female focus group and questions were directed toward the theme of local participation of community members in water governance / management. This included their experience with participation, their impression of opportunities to participate, and the role of 'voice' as a form of participation. This FGD was recorded with a voice recorder with the oral permission of each

participant. I elected to seek oral consent in this group setting as to be sensitive to the differing education levels amongst the women participants.

The non-community focus group discussion was conducted at an NGO office with four participants of mixed genders. Participants in the focus group were recruited specifically for their diverse expertise and/or experience with water governance. The questions during this focus group were directed toward discussion around contentious or differing opinions that emerged during preliminary analysis of semi-structured interviews, including the roles of bureaucracy, implementation, and individuals in water governance. Focus group sessions were recorded on a voice recorder with the permission of all participants in the active focus group.

The process of water governance in the context of a national or state level water project is inherently multi-level with the involvement of many different sectors, government agencies, NGOs, community members and more. Focus groups revealed the power dynamics involved between and amongst stakeholders in water governance and introduced the possibility for a more nuanced understanding of the roles of different people throughout the mechanisms of governance. Additionally, focus group dialogue contributed to the richness of concept explorations, as diverse perspectives often sparked discussions on a topic that someone may have not thought to include in an individual semi-structured interview (Morgan 1996, 1997; Stewart and Shamdasani 2015). Therefore, the use of focus groups gave further context to the research objectives outlined and contributed to the robustness of the data used for analysis.

3.2.2.5 Sampling

Recognizing that I conducted research in physical localities that I had no prior access to and only had an initial few contacts, this research used snowball sampling to identify potential participants. The Ashoka Trust for Research on Ecology and the Environment (ATREE) acted as my host organization during data collection, including an extensive network of professionals involved in the water sector in India. They facilitated most of my initial contact with potential participants, gatekeepers, and water professionals. Notably, Dr. Sharachchandra Lélé was particularly helpful as my host advisor. His longstanding engagement with numerous people involved in water governance in India enabled me to be connected with some key individuals very early in the stages of my field work.

The nature of snowball sampling allowed me to have one or two initial contacts who then become instrumental in connecting to other potential participants. In communication with colleagues at ATREE, I asked for internal references and contacts to include in my research in order to build my potential sampling network. I used this technique to contact individuals who then further directed me to other relevant stakeholders or experts and the snowball sample grew in this way. Additionally, I asked the individuals I interviewed and built rapport with to refer me to other potential participants for interviews and focus group discussions. I continued to stay in contact with my initial key informants and contacted individuals who were willing to meet with me for semi-structured interviews. This sampling was also facilitated through my local research assistant in developing a community member network. A verbal script was used in this recruitment process where appropriate (see Appendix B).

The sample included semi-structured interviews with 29 individuals or households and 2 focus group discussions consisting of 4-10 participants, including but not limited to interviewees. As qualitative research is often by nature exploratory, there is not a definitive number of interviews that will guarantee data saturation, but there are a number of factors that were used to create an estimate. Epistemologically, this research engaged with different ways of knowing and with many different kinds of interviewees, including but not limited to government and NGO employees, academics, and village or community members. Because knowledge both overlapped and differed among different participant groups, it was deemed appropriate to seek out at least 5 interviews as representatives of each of the different water governance stakeholders (NGOs, academics, bureaucrats, politicians, rural community members, etc.). Additionally, it was appropriate to seek more opinions amongst particular categories of participants when new information or themes were continuing to arise from semi-structured interviews. For example, community members' voices or experiences are often unconsidered and it was deemed beneficial to gain the perspective of more than 5 community members in order to create a holistic picture that encompassed factors influencing access to water, like gender, caste, and regional differences. Through this method, data saturation was reached (the point at which interviews and focus groups are no longer eliciting new information but just repeating what is already captured in the previous data) as time and resources allowed.

3.2.2.6 Scoping and Observations

Prior to starting semi-structured interviews and conducting focus groups, an initial scoping stage was observed. This involved informal social engagements and site visits for the identification of potential case studies and relevant stakeholders. These meetings and visits helped to create a preliminary understanding of local, regional, and national water governance in India. It additionally allowed me to build rapport with individuals and organizations involved in or impacted by water governance. Observations during this period were documented in a journal, organized sequentially by date. No names or identifiers were used in observational notes, but notes include details pertaining to: structural observations of water infrastructure; possible water governance mechanisms in place; community observations and perceptions on current water governance mechanisms; anecdotes and other physical observations; significant processes occurring in the setting; initial thoughts on successes and challenges in the water governance landscape; colloquial terms and other cultural nuances; and key emerging analytical ideas.

The initial scoping phase began with informal meetings with people around my partner organization – ATREE. These meetings with individuals at ATREE let me employ the expertise of the numerous researchers and practitioners, supplementing my review of the literature with practical and academic experience from the realm of water governance & management in India. These connections also allowed me to further develop my local network as ATREE colleagues introduced me to different organizations and individuals local to Bangalore, as well as others around India who they thought would be helpful. These informal meetings and connections not only informed a further review of relevant literature and bolstering of my local network, but also played an important role in my snow-ball sampling as this type of sampling is network-dependent.

I also conducted site visits to numerous locations around Bangalore to make observations and confirm the relevance or appropriateness of potential case study sites. These site visits took place in three districts of Karnataka: Bangalore Urban District, Bangalore Rural District, and Kolar District. These site visits included surveying of past water projects, as well as informal conversations with rural inhabitants, bureaucrats, politicians, NGOs, and CSOs. Site visits also included cultural immersion experiences like eating meals and taking chai with different community gate-keepers, people who were important to building rapport and networks in the different areas.

Based on this preliminary scoping, I confirmed the relevance and appropriateness of two case study sites for detailed data collection surrounding the three objectives of this research. Particularly important to this was the support of my colleagues at ATREE who helped me narrow down and identify relevant case study communities. This included going through long lists of possible communities who had received support in recent years for water projects through state or federal assistance. Through this process, the two case studies were chosen.

During this phase, I hired a field research assistant who traveled with me during all site visits and translated all community member interviews and focus groups. My colleagues at ATREE were instrumental in helping me find someone with appropriate experience and language skills. My field assistant was a male in his late twenties who was born and raised in the rural areas outside Bangalore. His mother tongue was Kannada (the local dialect to Karnataka), but was proficient in English, as well as a handful of other languages. Though we did not discuss his connections to the caste system, he appeared to be well-respected in the community and belonged to the lower-middle class economic group. He additionally had experience with administering surveys for scientific research so he was familiar with the value of field work, though we spoke in depth about the specifics of interview-based research as he had not done this particular kind of data-gathering. My field assistant and I worked extensively together to make sure interview questions were translated accurately, but also in an approachable manner that translated the meaning and intent of interview questions. This was done in an iterative process. First, we translated the questions together and wrote them out in Kannada. At our next meeting before interviews had begun, I had my field assistant translate the Kannada questions back into English to make sure they were capturing the meaning of the question properly. We went through this process a few times until we were satisfied that the translations matched the English questions well enough. We would revisit the translations whenever answers did not seem to correlate during interviews as well. Additionally, I conducted some trainings with my field assistant on interview and focus group facilitation. This had a particular importance paid to enabling all voices to be heard in focus group settings, especially where gender is concerned.

3.2.2.7 Analysis

Analysis of the data collected in India over a four-month period from May to August of 2016 was done through a qualitative case study approach with some variations on a grounded-theory approach. The use of shared data across all participant groups was used to represent India as a case

study country. The two case studies at the micro level, as well as the inclusion of meso and macro perspectives enabled the data to be analyzed at different scales. As much of the literature points to the relevance of context for determining what constitutes 'good' water governance, coding the data at different scales allowed the context to be highlight. Benefits of using grounded-theory are the allowance of trends to arise from the data itself rather than a particular theoretical lens, as well as meaningful analysis of contextual trends (Creswell 2013). This contributed to the ability to explore the process of water governance for SDG 6 in India. Using a grounded theory approach further benefitted this research in particular as analytical frameworks for water governance are generally lacking, especially for assessing enabling and hindering factors. Additionally, the focus of this research on SDG 6 targets gave another analytical perspective through which the information was viewed and coded, providing some direction and boundaries to the use of grounded-theory concepts and approaches to analysis.

3.2.2.7.1 Semi-structured Interviews

As is common practice in qualitative research, I went through the data in three broad steps, first preparing the data for analysis, then looking over all the data to get a general understanding, and finally coding the data iteratively (Creswell 2014). Analysis of unstructured data included both open and axial coding (Creswell 2013; Bryman 2015). Broadly, I went through the data in two rounds of open-coding and one round of axial coding. As interviews were transcribed and anonymized, I went through each transcript as a whole and noted my general first impressions, including categories and themes for participant answers through a simple form of open coding.

Because the primary concern of this research was to investigate enabling and hindering factors of water governance in India, I gave a particular focus during initial rounds of coding to interview questions that encompassed observations around contributors to success and challenge for water governance. This was done through noting 'enabling factors' and 'hindering factors' in the transcripts as participants identified them. As factors were identified, I recorded them in summary tables.

During these initial coding rounds, the non-community participants were separated into two levels: meso-level responses and macro-level participants. This was done through a combination of using participant background information given in the interviews, as well as noting the general level

to which their responses correlated, either meso (state) or macro (national). Originally, I had only separated the semi-structured interviews into the two analytical categories – community and non-community – because I believed this would likely be the best way to organize the data. It became apparent when going through the non-community interviews and detailing the water governance landscape of India that there were more so three distinct levels than two, including noticeable differences in the responses of participants from these meso and macro groups. This was also reflected in the structure of the water governance system in India (detailed in chapter 4). Subsequent tables of responses were detailed for three different participant groups (micro, meso, macro), as well as in combined 'all non-community' and 'all-participant' iterations. This included iterations that highlight all total responses, as well as only shared responses. This allowed me to view the data in many different ways and assess how the commonalities and differences relate to my research question and objectives at different analytical levels

I used general impressions and obvious trends to create some preliminary systems maps, conceptual maps, and tables, as well as to brainstorm some possible larger categories or themes to look for during subsequent coding rounds (Creswell 2014). In particular, I created two major tables – one for non-community participants and one for community participants – which detailed the individual responses, both explicit and implicit, around hindering and enabling factors for water governance / management. This allowed me to view the data in one place, divided by participant group, and begin to see the connections or groupings that were arising amongst the individual responses. In these tables, I kept the community responses separate by case-study community, but organized them side-by-side in one table in order to honor the differences between sites, while being able to compare easily between them. In these tables, I also noted possible sub-categories that might detail the connections I saw between different individual responses.

After this, transcripts were openly coded line by line, highlighting important or relevant data (i.e. words, phrases, sentiments, surprising information, repetitions). During this round of coding, I added to the tables of enabling and hindering factors described above with individual responses that were not captured in the first round of open coding. Through this, I continued to group responses that I felt were similar or connected in some way to try and tease out succinct categories through which they could be grouped. This included brain-storming around possible categories. Grouping of individual responses was done in an iterative manner and was revisited throughout analysis.

During this iterative process, I began to notice broader themes that may be helpful through which to view the data. This process allowed me to group, assess, and regroup the data until all the data on enabling and hindering factors fit into the categories. Subsequently, axial coding was used to note these broader themes, starting out with as many as ten different possible categories and ultimately resulting in five succinct categories through refinement. In the rest of the document, these axial codes are referred to as themes and thematic areas. Categories were then labeled and connections between these categories described. This gave rise to additional tables that connected individual enabling and hindering factors to the axial themes (see Chapter 6). The tables went through various iterations with refinement in organization and presentation for clarity.

Surrounding the identification of thematic areas around which enabling and hindering factors were grouped, it is important to note that in the context of this research, the responses were coded based on the intention behind the interview participant's response. The coding of all the enabling and hindering factors in relation to the five thematic areas used the participants' intent and interview context to group the factors, rather than using all the possible ways in which it could be interpreted.

A final round of line-by-line, open coding was done after the data had been shaped into these themes. This was done to make sure that no responses were missed or important themes overlooked as analysis took place. This is important because one criticism of this analytical approach is that once the researcher begins seeing the data through the lens of certain categories and themes, other themes can be disregarded or overlooked (Moghaddam 2006). This additional round of open-coding attempted to address this possible bias by combing through the data again.

3.2.2.7.2 Focus Group Discussions

Audio data from focus groups was analyzed separately from the coded interviews, but was used to inform general themes to pay attention to in the data as well. Themes can be noted through the researcher's observations in causal links or expression of the phenomena under investigation (Glaser 1992), but they were also identified through discussions amongst FGD participants as a form of data that express themes generated from participants' understandings and experiences (Wheeldon and Faubert 2009). In this way, both participant-generated themes and themes observed by the researcher influenced the categorization and organization of data from the semi-structured interview transcripts.

Because the transcription and coding of the semi-structured interviews had begun before the focus group discussions were conducted, I also used FGDs as a form of triangulation, discussed immediately below in section 3.2.2.6.3.

3.2.2.7.3 Triangulation

Participants and other key informants were consulted to triangulate preliminary findings. None of the data used for triangulation contained identifiers of specific participant(s') involvement, but rather showed general trends. For example, preliminary coding noted an emphasis on the gaps and overlaps in accountability and enforceability at different levels, so this general trend was a theme explored with participants and experts. Direct quotes or participant information was not used in triangulation. Initial findings and trends were also presented to different focus groups of community and non-community participants in the form of a mini workshop series in order to give the people a chance to respond to the data set and initial findings. This allowed me to make any changes necessary at an early stage and also provide participants with early iterations of the findings. This was a valuable process because it allowed for findings to be cross-validated or challenged, removing many researcher biases. Also, this process gave the participants a chance to confirm the correctness of the information collected through the semi-structured interviews and focus group discussions.

3.3 Limitations and boundaries

Limitations of this study included scale, generalizability, sampling (access), biases, and cause-effect relationships. Scale was limited to local-national analysis within the case study country and high-level analysis for the international contextualization. This is limiting because the literature suggests that exploring multilevel results will provide the most accuracy within the context of environmental governance and the SDGs. Additionally, the case study could limit generalizability of results because data collection is happening within one country and one case study, which may or may not have a unique combination of factors that make analysis and recommendations heavily case or context specific. Generalizability can potentially be sacrificed then for accuracy and specificity. Access was also a limiting factor, though to a lesser extent. The kind of data on the national scale in India required interviews with prominent figures in the water governance landscape which were challenging to secure, though two interviews with high-level officials were conducted. Access to

information on SDG 6 in India was limiting also because it is a newly framed goal which has not yet been fully integrated into the national, regional or local water governance mechanisms. While many of the goal's targets are easily identifiable in national, state, regional, and local efforts to meet water needs (i.e. access to clean water, access to a toilet and hand-washing station, etc.), there was a definite lack in goals pertaining to human-environment connections and water for ecosystems. There is also an unfortunately small amount of literature on water governance and WGMs in India which limited my ability to address the Indian context specifically in my literature review, though I tried to gather further information and resources in the field to overcome this deficit. Biases (social, cultural, normative, etc.) of participants have the potential also to influence the dataset. Finally, cause-effect relationships established in analysis are difficult to definitively prove, especially in realms like water governance and social-ecological systems where complexity is inherent.

Another limitation I would like to highlight connects to my own gender and cultural background. As a woman, I believe some of my interviews, especially with non-community male participants, lacked the depth or specificity I wished to obtain. In connection with the depth, some participants refused to dive deeper into a topic even when prompted, likely because they did not trust my capacity to understand as a female researcher. This lack of depth was also connected to my status as a "foreigner" or "westerner" as participants assumed my knowledge of the Indian context was shallow based on my cultural background. Concerning specificity, my gender and/or cultural background limited the data as some participants, overwhelmingly male, would not actually answer the questions I asked, even when prompted or redirected back to the specific question, and instead would speak on what they believed were important subjects for me to hear. I developed strategies to try to combat these limitations, such as showing my intimate knowledge of Indian governance structures early on in our meetings as a form of reassurance and/or redirecting the participant to the specific question I asked until they answered the particular question at hand.

Boundaries in this study were namely SDG 6 targets, the case studies, and social-ecological systems. SDG 6 has 8 targets and my research only engaged specifically with targets 6.1 and 6.2 which concern 'universal access to clean drinking water and sanitation.' This boundary enabled my research to create more meaningful analysis for achieving targets 6.1 and 6.2, but my study also discussed targets 6.3, 6.5 and 6.6. in order to enumerate on the nuanced ways in which the targets interact. This study specifically does not engage with SDG 6 target 6.4 which concerns increasing

water-use efficiency in the agricultural sector. The case studies in India gave boundaries to data collection at the community member level in order to give the ground-level analysis concrete and specific contexts, though interviews with non-community members were conducted with appropriate knowledge-holders across India and internationally. Finally, this research worked within the bounds of a social-ecological systems perspective as a critical lens through which to engage with the data and analysis in a manner reflective of the concept of sustainable development.

Overall, this chapter covered the methodology and methods through which this research was conducted, including also information on the case studies, sampling, analysis, and boundaries. The use of a qualitative case-study approach informed mainly by pragmatist and transformative worldviews shaped the methodology, while the use of semi-structured interviews and focus groups constituted the main methods. A detailed overview of the case-study contexts was also presented in order to highlight the important nuances between the two micro-level case study sites. This is complimented by the use of micro, meso, and macro perspectives which facilitates a multi-level approach to investigating SDG 6 achievability. The analysis of data was also covered in this chapter, including broadly the preparation, general assessment, and coding of the data in an iterative process. Finally, the limitations and boundaries of this research were discussed, highlighting how this research was scoped to address the research objectives most effectively. The next chapter will start with Objective 1, creating an understanding and analysis of current water governance in India.

CHAPTER 4
The Water Governance Landscape: Structural, functional, and normative dimensions of water governance in India

Table 1.1 – Research Objectives

Objective 1	**To explore and analyze the existing water governance mechanisms (institutions, instruments, treaties etc.) that can either facilitate or impede water governance at multiple levels with attention to the SDG 6 on water**
Objective 2	To capture multi-level experiences around success and failure in water governance for SDG 6 targets, especially key factors contributing to and/or hindering SDG 6 achievement
Objective 3	To synthesize insights and suggest ways in which existing governance mechanisms can be further strengthened on multiple scales in relation to SDG 6

4.1 Introduction

In this chapter, I explore and analyze the existing water governance mechanisms which represent the current ways we attempt to achieve water goals like SDG 6, especially in India. This exploration and analysis is valuable because it helps clarify (1) what kind of mechanisms currently exist and (2) their role in facilitating progress on goals like SDG 6. As noted in Chapter 2, water governance mechanisms can be understood as the avenues through which decisions in water governance are transformed into outputs and/or actions including the formal and informal rules, institutions, rule-making systems, and actor-networks (see Rogers and Hall, 2003; Franks and Cleaver 2007; Biermann et al 2009).

This chapter will examine water governance and its mechanisms in India. Though this chapter focuses on India, a short examination of water governance at the international scale is included in Chapter 2, Section 2.2. Some reflections on water governance at the international scale were included in the literature review to recognize the strong presence of the international community

in the establishment of water governance, as well as in designing and promoting water agendas and initiatives in general and SDG 6 in particular.

There are two driving motivations in asking this question of what exists currently as far as water governance mechanisms. The first motivation comes from a historical lack of achieving water goals (see Chapter 2 for examples). The generally uncontentious nature of goals connected to drinking water is indicative that the ways in which we are trying to achieve the goals is insufficient in some way(s). As goals and agendas around water continue to be created (MWR 2012; de Loë and Patterson 2017; Renouf and Kenway 2017), it is important to have a baseline understanding of the current state of water governance through which these goals are trying to be realized to understand these insufficiencies. Second, the literature points to the overall presence of complexity and diversity in current water governance systems, with both complexity and diversity being functions of the numerous social and ecological aspects that water invokes across different contexts (de Loë and Patterson 2017; Woodhouse and Muller 2017). Because water governance varies across contexts and involves complexity, it is important to understand the system under investigation. Having this baseline understanding will ultimately help delineate ways to improve the achievability of water goals going forward.

In order to have a more systemic approach to create a baseline understanding of water governance systems, I propose and use the concept of the **water governance landscape**. Recognizing the multi-dimensionality of water governance systems, in order to build a better understanding of water governance in India, it is necessary to examine and present what exists currently, including clarity on what mechanisms exist. Additionally, there are many unseen pressures at play, including the relationships between different mechanisms, as well as cultural, social, and political pressures. It is useful to make these less visible elements more explicit. In doing so, prevalent actors and trends within the water governance landscape can be delineated and examined. This works into the conceptual framework presented in Chapter 2 through creating a targeted and more systematic understanding of what constitutes water governance and water governance mechanisms in India.

In order to do this in a more systematic way, I define and explore the water governance landscape through the lens of three salient dimensions, namely the structural, functional, and normative features (*see* Figure 4.1). These three dimensions will allow for a general understanding of

who is involved, what is being done by whom, and the rules (both informal and formal) at play, respectively. These dimensions were chosen as this approach and variations of it have been used in many other studies looking at institutions and governance (Miller 2008; Piattoni 2010), though it has not been applied specifically to water governance. Using this approach to examine water governance for SDG 6 in India is helpful because it provides a general basis through which to engage with complex water governance systems. Limitations include that this is largely a descriptive approach and highlights governance systems as they are designed, but not necessarily as an assessment of how they may function in the reality. I tried to address this limitation through not just using primary data, but also incorporating participants' perceptions of the water governance landscape in order to capture disconnects between structure and function, as well as detail normative pressures. This is also a useful approach in relation to the conceptual framework because it defines a clear boundary or scope for inquiry around water governance and its mechanisms, especially for SDG 6.1 in India.

Understanding these structural, functional, and normative dimensions of the water governance landscape is important for many reasons. Considering structure, first and foremost structure often gives rise to function (Meadows, 2008), which means the structure itself will play an important role in how (and how well) a system functions. Understanding structure can also help make the relationships, or lack thereof, between different actors more clear. This can be important to

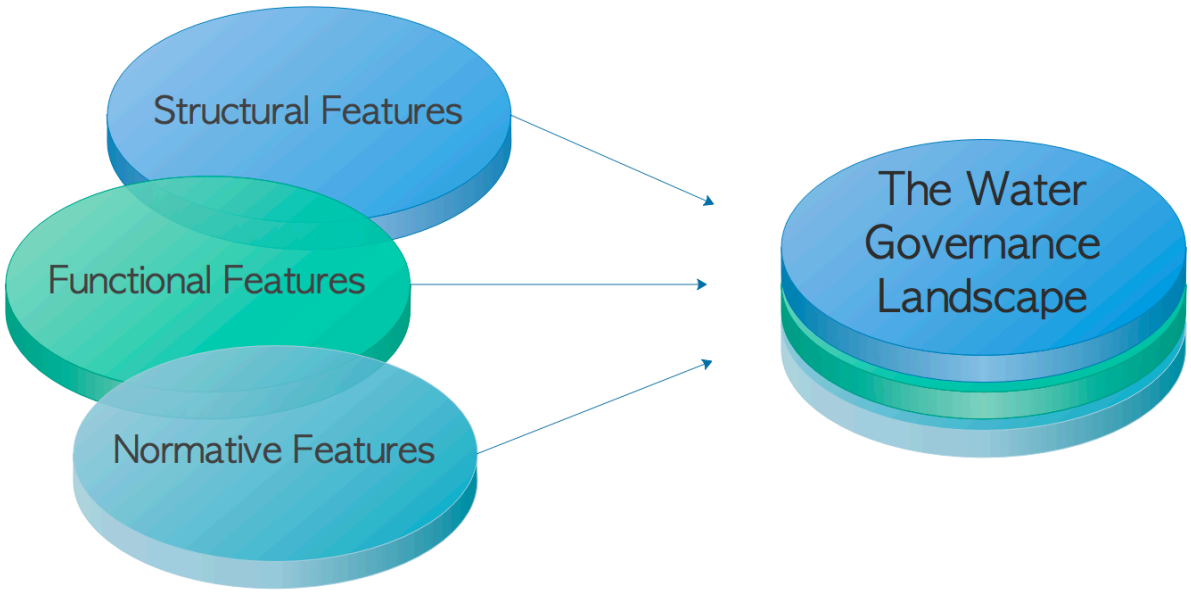


Figure 4.1 The three dimensions of the water governance landscape – structural, functional, normative

understanding power relationships, including how some actors or practices are systematically empowered while others are disenfranchised. Additionally, understanding the structure of a system allows for the delineation of leverage points, important places for intervention in a system, particularly when change or transformation is desired (Meadows 2008). Function is important to consider because the roles of each player within the system show how the system operates. Meadows (2008, p14) writes, "If [some aspects of systems] are hard to see, *functions* or *purposes* are even harder… The best way to deduce the system's purpose is to watch for a while to see how the system behaves [as] purposes are deduced from behavior, not from rhetoric or stated goals." This combination of structure and function can then reveal the true aims of a system, which may or may not be in line with the expressed aim of that system. Understanding function also contributes to a more nuanced understanding of avenues to action or ways decisions and projects are implemented. Noting the normative aspects at play in a system gives context through showing the formal rules and principles that the system and its players operate under. It also allows for some of the informal or intangible forces at play to be explored or recognized in a more explicit way when they might otherwise be overlooked. The normative features are also important because they may ultimately lead to the structural and functional makeup of the water governance landscape. While there are clear relationships amongst the structural, functional, and normative dimensions, their interplay is not static, but may give rise to multi-directional influences upon each other.

The structural, functional, and normative dimensions of the water governance landscape will ultimately create a general picture of the aims of the water governance system. The structure, functions, and norms of the system together show *who* is working toward *what*, *how*, and *under what* paradigms or pressures. Considering the conceptual framework, this approach will clarify exactly what constitutes water governance and water governance mechanisms. This will also illustrate the targets at which the system is aiming, allowing for further engagement on how to redirect aims if needed and optimize function toward the desired SDG 6 aims under the prevailing pressures and paradigms.

As the ultimate goal of this study is to understand what enables and hinders water governance in India for the achievement of SDG 6 targets, exploring the structural, functional, and normative features of the water governance system in India will be beneficial as a starting point to engage with the current state of water governance, WGMs, and SDG 6 achievability in India. The examination of

the water governance landscape in India should then be understood as an examination of water governance for at SDG 6 targets 6.1 and 6.2 rather than a comprehensive description of all water governance in India

4.2 India's Water Governance Landscape

4.2.1 Overview

Focusing on India in particular, there are also structural, functional, and normative features that make up the water governance landscape. Through, formal interviews, relevant literature, use of other primary data like the government and NGO websites, and informal conversations with key informants, this descriptive summary of the water governance landscape in India was created. An institutional map, with iterations for the structural, functional, and normative features, was also created from this descriptive summary.

Institutional maps are a useful tool to show structural arrangements, as well as the functional and normative features, where it may be complex to solely describe. While water governance in India is overtly complex and involves more nuance than is detailed below in Figure 4.1, it is nevertheless helpful to visualize the water governance landscape in a more concrete way. The institutional map in Figure 4.1 shows the basic structural features of the water governance landscape in India. This map was created specifically with SDG 6 targets in mind, particularly targets 6.1 (clean drinking water) and 6.2 (sanitation and hygiene). Figure 4.1 can be understood as a simplified representation of who is involved in decision-making and implementation related to these SDG 6 targets 6.1 and 6.2 within India, including but not limited to policy-making, schemes (national and state projects / programs), project mobilization, coordination, and funding. The structures, functions, and norms were determined through the corresponding references to primary documents and academic literature, as well as through use of participant insights and triangulation with water governance scholars and practitioners in India.

It should be noted that the following structural and functional descriptions are a combination of what these entities are 'supposed to do' and what they 'do in reality'. Especially surrounding the government organizations, their functions and responsibilities are usually delineated in legal

documents so what they are 'supposed to do' (structures and functions) is very clear, though *how* is not delineated as clearly and enforcement mechanisms are often lacking (Prathapar et al 2002; Richards and Singh 2002). As such, these functions do not always happen in reality (Srivastava 2012). In some cases, the structural body might not even exist for various reasons, even though it is 'supposed to.' For example, the Karnataka Rural Water Supply and Environmental Sanitation Project "mandated the creation of VWSCs in every village" (Prokopy 2005) but in reality, VWSCs are only formalized in some panchayats (Srivastava and Rajadhyaksha 2016). This was further supported during observations of my case study sites where one site had many VWSCs and the other had not even heard of the VWSC. It is important to keep in mind that the picture created below through describing the water governance landscape in its structural and functional aspects should be understood as accurate portrayal of how water governance is 'supposed to' happen, as well as how it happens 'in reality'. A discussion on these disconnects is included in 4.4.

4.2.2 Structure

When considering the water governance landscape of India, it is first important to understand the general structure. This structure consists of numerous entities across varied sectors, but each holds an observable place in how decisions are made about water, policies designed, schemes implemented, and actions funded.

Structurally, water governance for SDG 6 targets within India happens through three governance units – the national government, the state government, and civil society. Each carries their own authority and jurisdictions, functioning independently at times, but depending on the context, these three governance units may either engage with one another, operate independently, or operate hierarchically. Therefore, it is important to describe these three governance units so the lateral and hierarchal structure of water governance for SDG 6 targets in India is clarified. There is also one informal avenue for water provisioning (SDG 6.1), noted as 'informal providers'. Figure 4.1 below depicts a map of these major structural features of the water governance landscape in India, specifically for SDG 6 targets 6.1 and 6.2, but with implications for the broader governance of water. In Figure 4.1, the major actors or institutions within each of the three governance units are detailed further. This clarifies the general structures through which water governance and management take place. They are detailed to the extent that it enables a general understanding and clarity within the scope of the conceptual framework.

As described above, these three governance units are undoubtedly interconnected structurally, but they do operate variably, sometimes in hierarchical manners and at others times independently from one another. Figure 4.1 captures this variable relationship between the governance units by representing them on the same lateral plain, showing their interconnections and independence simultaneously. Informal providers are highlighted in the state section, as they operate mainly within those systems, filling gaps in state-led provisioning.

4.2.2.1 National

At the national level, there are numerous ministries and policies that guide water governance. The ministries are the national-level government departments which oversee different focus areas or subjects, including but not limited to administration, policy setting, and funding mobilization. According to the Right to Information website for the Indian government, there are 60 ministries (RTI 2017). These ministries influence the governance and management of many particular aspects of water across the country. Each ministry also holds a special jurisdiction over different issues pertaining to water, encompassing to some extent each SDG 6 target, as well as other specific areas beyond the scope of SDG 6. For example, the Ministry of Agriculture encompasses agricultural projects including irrigation [SDG 6.4] (MAFW 2017), the Ministry of Drinking Water and Sanitation encompasses rural water projects for WASH outcomes [SDG 6.1, 6.2] (MDWS 2017), the Ministry of Shipping is in charge of ports (Ministry of Shipping 2017), the Ministry of Water Resources is in charge of development and management of water resources including infrastructure building and monitoring [SDG 6.3] (MWR 2017), and the Ministry of Environment, Forest, and Climate Change encompasses water in natural preserve areas [SDG 6.6] (MEFCC 2017). There are numerous other ministries that govern water in some regard, but these examples provide context to the numerous different ways ministries and their departments are involved as entities in water governance in India. The National Water Policy (2012) is also an important feature at the national level as it is a guiding document for the development of water governance, law, and defining priority areas related to the SDG 6 targets.

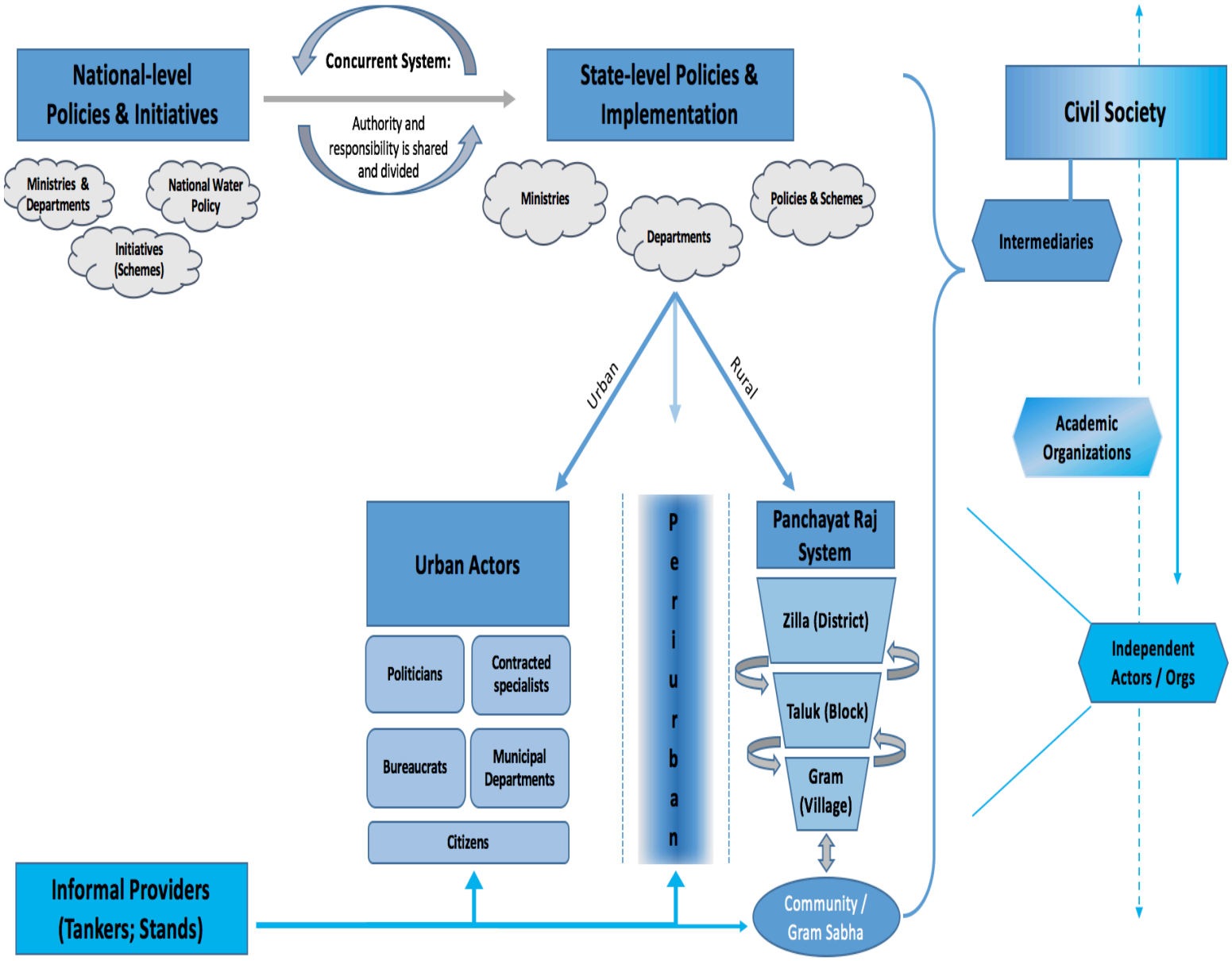


Figure 4.2 – Structural Map: Water Governance in India for SDG 6

4.2.2.2 State

At the state level, there are also ministries and departments that are organized in a similar way to how the national-level ministries are described above. While the ministries and departments at the state level tend to mimic those at the central level, each state is unique. Each state varies slightly in the name, verbiage, and responsibilities of different ministries, but there is an overall trend to the state-level organization of these ministries and departments considering water governance. Structurally, the organization from the state-level down to the community level (as it pertains to state government) tends to be more hierarchical. At the top level, ministries and departments either accept the vision and policies of the national government surrounding water, create their own policies and initiatives, or some combination of central-government prescription and state-level creation. From there, these state-level decisions and programs are mobilized through different avenues depending on the kind of community it concerns, particularly across rural, urban, and periurban areas.

In rural areas, the Panchayat Raj system is the mechanism through which state-level decisions and programs about water are implemented. The Panchayat Raj system has three distinct structural levels: the Zilla (district), Taluk (block), and Gram (village) panchayats. The Zilla panchayat or district level (used interchangeably) is the top hierarchal level of the Panchayat Raj system. Each of the 36 states and union territories has between one and 75 districts according to the 2011 Census of India (Government of India 2011) and the demographics vary drastically depending on the district. At this level of administration, there are numerous elected and appointed positions that are responsible for implementing schemes and providing funding, administering smaller scale projects / programs, and also representing the citizens in the State Legislature. Below the Zilla Panchayat is the Taluk Panchayat or block level (used interchangeably). These elected and appointed positions further involve the implementation and funding of schemes, as well as smaller scale projects. Below the Taluk Panchayat is the Gram Panchayat. Gram Panchayats consist of elected representatives that represent about one to ten villages based on population limits which vary by state. For example, in Karnataka the maximum size of a panchayat is 7,000 people (Government of Karnataka 1993). Gram Panchayat members are members of these villages and directly communicate with the citizens to hear their problems and ideas. This is done either individually or collectively through the Gram Sabhas, a body that encompasses all voting age adults within a Gram Panchayat with voluntary attendance gatherings to discuss important topics in an open forum. Communication amongst the three tiers of the Panchayat Raj system usually occurs hierarchically.

In urban areas because of the sheer volume of people, the Panchayat Raj system cannot function in the same way and instead, water is governed and managed through a series of political, bureaucratic, municipal, specialist, and citizen bodies. These urban areas are still called districts and have similar elected and appointed positions, but the organization of the administration below the district level differs from the Panchayat Raj system and varies by state. Generally, urban districts can be understood as different municipalities, under which they are broken down into smaller constituencies. Bureaucrats, which are generally people from the Indian Civil Service, are appointed to support politicians in the administration of these areas.

While the municipalities and constituencies make up the major areas under government administration, responsibilities are also shared between multiple other groups. Municipal departments, which can be public or private, are generally in charge of sewage disposal and water supply. In Bangalore, one of the biggest cities in India, this is run by the Bangalore Water Supply and Sewerage Board (BWSSB) which is a government agency. In some areas, specialists are contracted as well to advise on projects and decisions. Citizens also weigh in frequently – like through protests, strikes, voting, and appeals to their representative – or circumvent the formal water governance system, by purchasing water from elsewhere (see 'informal providers' below).

In periurban communities, the structural features of water governance / management are a bit more unclear, especially considering there is no consensus on what defines the periurban interface. Periurban areas represent both the sprawl of urban areas as well as the absorption of traditionally more rural areas (Allen 2003). In India, this manifests as the expansion of apartment buildings and homes for urban housing, as well as infrastructure for businesses. This expansion pushes out into lands that were previously rural areas represented under gram panchayats, changing the traditional demographic indicators of communities. Incorporation of these areas into the urban constituencies has been found to disenfranchise the members of formerly rural inhabitants who are now represented in a constituency with many more people and often different values, needs, and livelihoods (Allen 2003). This particularly influences communities' relationships with water (Allen et al 2006a). Because these areas are characterized by change and complexity in their governance, the structural map represents the periurban as laying somewhere between the Panchayat Raj system and the urban political systems and has sparked debate into how to incorporate these areas, especially considering WATSAN issues

(Allen et al 2006b). The porous edges – shown as dotted lines – indicate that periurban spaces may draw from either side of the structural arrangement, but ultimately that these changing and transitional areas are not represented as equally or formally in the water governance and management structure. This porousness of governance in periurban areas is also represented in Figure 4.1 through the periurban space being compromised of a changing color gradient.

4.2.2.3 Civil Society

The third layer to the structure of water governance / management in India is civil society, which works with the national and state governments, but also independently. When working with the national and state governments, civil society organizations align structurally as intermediaries who help in numerous ways, including as consultants, contractors, and community liaisons. This tends to happen mostly from the state level down. Sometimes, civil society aligns independently of the government structure in order to implement their own projects around water provisioning as well. For example, Arghyam is a CSO based in Bangalore who funds water-related projects and they often choose to sponsor small-scale community projects that empower localized decision-making and management of water resources (Biswas 2012). These projects can also be implemented within panchayats as a means of defining a manageable scale, though there are certainly many independent projects in urban and periurban areas as well.

The civil society category also encompasses academic organizations that sometimes align structurally with the government to influence water governance / management, while other times they act completely independently. Through funding and consultation, academic organizations investigate topics and provide feedback on others within the sphere of water governance / management. This knowledge creation and sharing can be sanctioned by the government, but it also happens independently as research within academic organizations is executed and published. Academic organizations also work with other CSOs like intermediaries and independent actors / organizations. In this way, academic organizations belong to a structural grey area (noted on the map with two-tone blue) of working within and outside the government system, which parallels the structural trend of civil society in water governance / management in general (also noted on the map with two-tone blue).

4.2.2.4 Informal Providers

While there are three major governance units in the formal water governance of India, there is a final structural feature to water management for SDG 6.1 and 6.2 targets noted on the structural map as 'informal providers.' Because there are often gaps in access to water across urban, periurban, and rural settings, people have sought other ways to meet their needs. As a result, both formal and informal businesses have sprung up that will provide access to water in a location where local sources are unreliable in quantity or quality. This can be for anyone from rural villagers to entire apartment buildings and is usually done through bringing water in large tankers. In some locations, water provisioning also occurs in the form of water stands through a pay-per-bucket system. These actors are not formally part of the governance arrangement and are not considered a governance unit, but it is important to recognize their role in the provisioning of water, and therefore the ground-level management of water. It is also important to note that these informal providers are not necessarily altruistic, as can be found in the literature surrounding the existence of 'water mafias' in India (Shaban and Sattar 2011; Graham et al 2013; Ranganathan 2014).

4.2.3 Function

The functions of the structural areas explored above constitute a considerable amount of redundancies and overlaps. Nevertheless, each of the three governance units will also be discussed from a functional perspective. As many of the individual functions of each entity represented on the structural map was discussed, this section will not further detail each and every responsibility and function of the individual entities, but will note the more general functions and responsibilities in broader categories (such as policy design, implementation, funding, etc.) in regard to SDG6 targets 6.1 and 6.2.

4.2.3.1 National

At the national level, there are four main functions of the governance unit: funding, vision-setting, policy design, and scheme design. A major part of funding for water projects and initiatives comes from the central government, so one of their major functions is funding (Gunyon 1998; MWR 2012; MDWS 2013). In noting the multitude of players in the national-level structure, ministries also play an important role in setting the agenda or vision for water governance across numerous sectors (MWR 2012). This agenda setting around water has more and more been done in a collaborative manner (*see* Mollinga 2005 versus Cronin et al 2014), taking into account scientific and practical

knowledge from entities brought in for consultation, as well as international agendas [SDG 6.a & 6.b]. This is exemplified by the recent process that established the National Water Policy (MWR 2012). Of course, the National Water Policy, as well as numerous other policies that impact water governance and management across India like the Twelfth Five-Year Plan and a policy for groundwater that is currently being designed, shows the other function of the national-level: policy design (Planning Commission 2012). Finally, at the national level there is also scheme design (Cronin et al 2014; Cronin et al 2016), or the design of specific projects for implementation on the ground, though the center does not implement these themselves. An example of this is the Rajiv Gandhi National Drinking Water Mission (MDWS 2013).

4.2.3.2 State

The upper state level also has four main functions: funding, policy-making, mobilization, and administration. State governments provide a significant amount of the funding for water projects, in conjunction with the central government (MWR 2012). While sometimes this funding is contingent on the state accepting the programs and policies laid out by the central government for water, they can allocate their own state budget toward water projects in addition to funneling central money into state level and localized projects. As such, the state can choose to set their own policies instead of adopting central government programs and policies since water is a state subject when the water is within state borders (*see* Seventh Schedule, Article 246 in Constitution of India). Because there is significant funding that comes to the states if they use central policies and programs, much of the time, states opt to accept central government policies and programs, though states can choose to supplement these with their own policies as well. The upper tiers of the state government also play an important role in mobilization of both money and information. Considering money, large NGOs like UNICEF and the World Bank tend to fund projects through state rather than central governments (WHO and UNICEF 2005). This means the state talks to and mobilizes this funding for projects. Regarding the projects, because the state does not play a role in implementation, they are responsible for mobilizing information about these projects to urban bodies, NGOs, and the Panchayat Raj system, including information about how to access funding and how to implement projects. Finally, the state government is responsible for administrative concerns (Arora and Goyal 1995) meaning all paperwork and communications that are needed to complete all the other functions mentioned above.

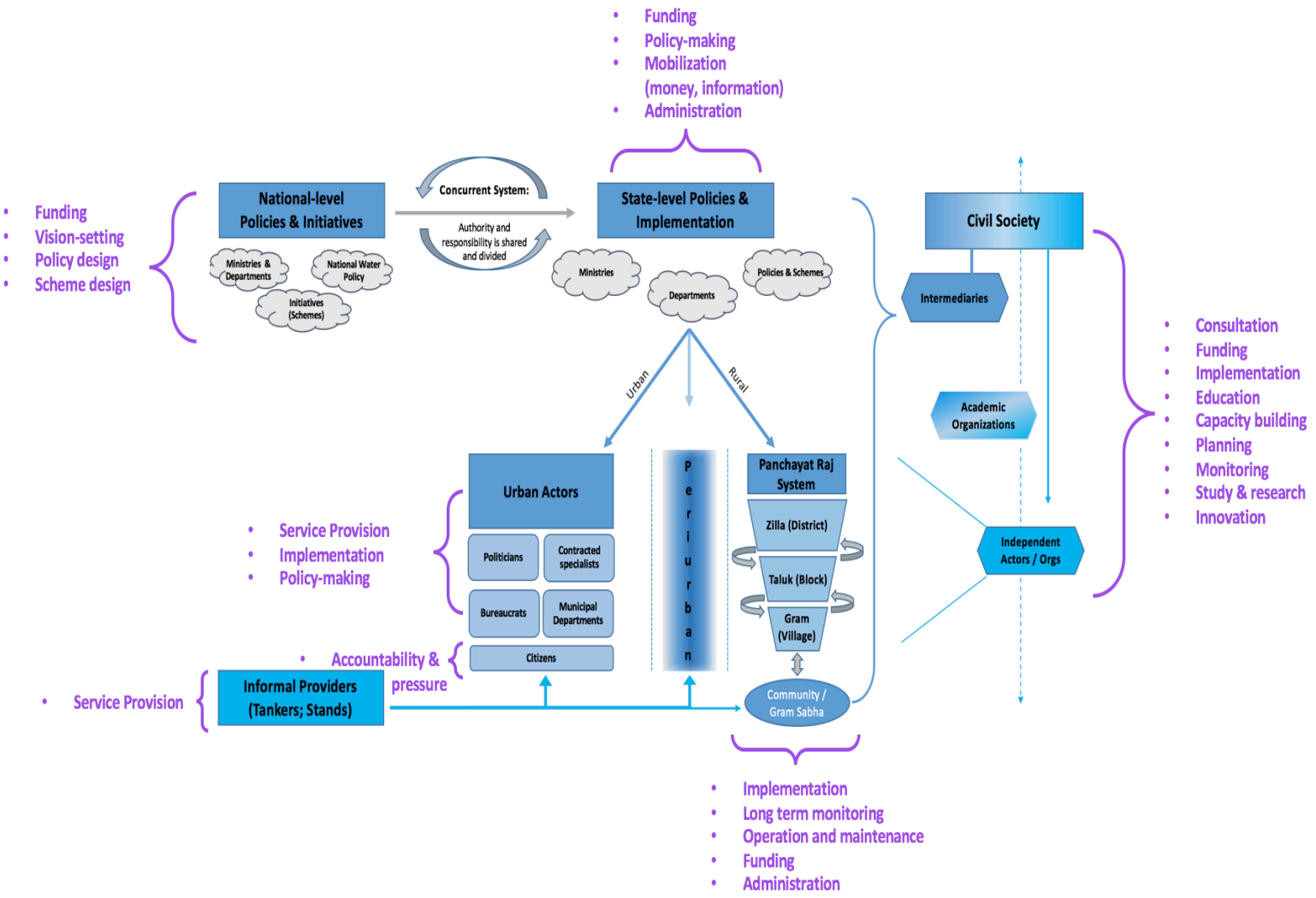


Figure 4.3 – Functional Map: Water Governance for SDG targets 6.1 & 6.2

In urban districts, the actors involved in water governance / management mainly play roles in service provision, policy-making, and implementation. Service provision is one of the more obvious functions, comprising infrastructure building, operations & maintenance, and the distribution of water (Arora and Goyal 1995; Cronin et al. 2014). Considering policy-making, there are often localized and specialized needs that arise depending on the geography and demographics of an urban area. As such, urban government bodies will often set policies around water (McKenzie and Ray 2009), especially concerning the use and conservation of water. Different actors in the urban space are also responsible for project implementation (McKenzie and Ray 2009), though projects can come from a number of entities such as the general citizenry, CSOs, NGOs, and the state government (Sahu 2016).

The Panchayat Raj system serves the functions of implementation, monitoring operations & maintenance, funding, and administration for rural areas. Panchayat Raj splits these responsibilities across the three different tiers of Panchayat Raj depending on the scale of the project. It can be understood that generally the functions associated with implementation, monitoring, and operations & maintenance tend to involve the Taluk and Gram panchayats (PEO 2010; Linneck 2016; Hutchings et al. 2017), while funding and administration tends to involve the Taluk and Zilla panchayats (Hutchings et al. 2017). Considering implementation, the panchayats are responsible for implementing projects through hiring and paying people to complete a water project, such as the drilling of a bore well or installation of a piping system (Linneck 2016). When state sanctioned or civil society projects are implemented in an area, the higher levels of Panchayat Raj, as well as the civil society actors, may monitor the project in the short term, but overall, the Taluk and Gram panchayats (and to some extent the community at large) are expected to sustain projects in the long run, including the monitoring of water quality and access to water (Hutchings et al. 2017). This sustaining of projects also includes the operations & maintenance of water projects, which in part is done through maintaining a 'water man' on the panchayat payroll who is supposed to operate and maintain the systems on a daily basis (Linneck 2016). Some of these operations and maintenance costs are part of the funding functions of the Panchayat Raj system. The role the Gram panchayat plays in this is applying for funding (PEO 2010), but ultimately the Taluk and Zilla panchayats mobilize and release funds for these ventures (Hutchings et al. 2017). The Taluk and Zilla panchayats are also responsible for the administration of these projects, including the Zilla panchayats disseminating information to the lower panchayat tiers and taking care of any paper work associated with different water projects (PEO 2010; Hutchings et al. 2017).

The community is a part of the Gram panchayat through the Gram Sabha body and their function is mainly to give voice to the issues being faced by the people, as well as weigh in on desired solutions (Linneck 2016). The community also functions in theory as funders, as community members are supposed to pay for the water services they receive, as well as fund the operations and maintenance of water provisioning systems. While the state usually funds their water projects with about 90% of the cost, the community is also expected to put up a minimum of 10% of the cost (PEO 2010). These funding aspects of community functions are the formally denoted functions, but it is unclear how often these funding functions at the community level are fulfilled in practice for numerous reasons, including willingness to pay and ability to pay. This was also portrayed in interviews as some participants noted financial contributions as a function of the community.

The periurban areas do not carry out a clear function, except loosely in that the people living there are either beneficiaries of the urban / panchayat / civil society water provisioning or they are unserved by these groups.

4.2.3.3 Civil Society

Considering civil society, functions are generally connected to the mission and objectives of the individual organization. Because civil society is so diverse in India (Mawdsley and Roychoudhury 2016) and encompasses anything from international NGOs to small academic organizations, this means that civil society ends of playing a number of important roles through the water governance landscapes including: consultation, funding, implementation, study & research, monitoring, planning, education, capacity building, and innovation. Consultation is an important function of civil society. Because many aspects of water are extremely technical and context matters for the sustainability of projects, civil society provides their expertise as specialists and researchers in consultation with local, state, and central government bodies for different outcomes (Inukonda 2017) This can also be interpreted as having an influence on the functions of agenda or vision setting in the government, though that is an indirect function of their larger function in consultation (Inukonda 2017). Civil society will often provide funding as well for different water projects (Mawdsley and Roychoudhury 2016), as well as their expertise for implementation of projects (MDWS 2013; Shah and van Koppen 2016). Part of implementation can be education and capacity building which involves people across the water governance landscape, including anyone from community members to upper-level

government officials (Biswas 2012; Mawdsley and Roychoudhury 2016). When working across these varying circumstances, sometimes civil society will also help different groups in planning for their water futures, for example with water security plans but also in guiding policy and practice at higher levels (Biswas 2012; World Bank 2015). Some civil society groups also function as monitors for many different kinds of information (Biswas 2012; Inukonda 2017), for example water quality and access, as well as usage statistics around sanitation. This can be a subset of or independent of their other function in study & research, where in many civil society organizations including NGOs and academic organizations create and publish knowledge, both quantitative and qualitative in nature (Biswas 2012; Phadke 2013). Last but not least, civil society also functions to bring innovation into the water governance landscape (Biswas 2012). Because experimenting with policy and practice at national and state scales is risky, many governments perpetuate conventional water management for meeting water needs that have been proven insufficient (Kumar 2009), while civil society has more flexibility considering their mandates and scales of engagement. This creates space for innovation, including around technology, policy, and practice. Overall, civil society provides variable and extensive functions throughout the water governance landscape.

4.2.3.4 Informal providers

Informal providers really only serve one function, which is service provision. This is particularly in areas where there are gaps in service provisioning, which can be for myriad reasons (McKenzie and Ray 2009; WHO and UNICEF 2014) including but not limited to: poor water quality, water quantities particularly groundwater, water accessibility, and lack of infrastructure.

4.2.4 Normative

It is important to first and foremost recognize when addressing the normative features of the water governance landscape in India that there are both internal and external factors. Internal factors are those normative features that come from within India, while external factors are those normative features which come from outside India. They do not exist in isolation from one another and there are surely feedbacks or influence of each on the other, but for the purpose of this general overview they are presented in a binary fashion. This is reflected below in Figure 4.3 which shows the internal and external factors which constitute the normative dimensions of the water governance landscape in India.

Normative can be understood to mean 'conforming to or based on norms' as well as 'of, relating to, or determining norms' (Merriam-Webster 2017). This definition highlights the role of normative features in establishing and reinforcing norms, as well as pressuring the system to conform or base itself around these norms. Meyer and Wieringa (1993, preface) define normative systems as "systems in the behavior of which norms play a role and which need normative concepts in order to be described or specified." This shows how norms are also drivers in determining the system. As such, normative features of the water governance landscape can be understood as 'norms which water governance and management conform to' and 'paradigms which drive water governance'. This shows that the normative features underpin the water governance systems, either through conforming or pressuring the system toward certain norms and paradigms. Normative features can then be understood as fluidly changing over time (Raven 2000). This is important to the conceptual framework particularly because in order to understanding water governance and its mechanisms, the current norms and normative pressures which inform the water governance system should be made overt.

4.2.4.1 Internal

There are four main internal normative features to the water governance landscape: current national water policies, the concurrent system for water, marginalization, and economic development. Current water policies at the national level are very influential from a normative perspective as that agenda and vision is heavily pushed. These policies include the Twelfth Five-Year Plan, the National Water Policy, and the forthcoming National Groundwater Bill (Aguilar 2011; Planning Commission 2012; Ministry of Water Resources 2012). The concurrent system in India really defines the rules of engagement and jurisdiction between the central government and the state governments. It is a particularly interesting normative feature also because it highlights state jurisdiction over central jurisdiction (Saleth 2004), which means that states do not have to follow with national agendas concerning water resources solely within state borders. The concurrent system places inter-state water bodies and rivers under the jurisdiction of the central government, furthering dividing authority and responsibility around water in India (Saleth 2004; Constitution of India). Also, the concurrent system has a tribunal system through which disagreeing parties can have issues resolved through legal mechanisms, particularly prevalent when disagreements between states arise over water.

The concurrent system has obvious and interesting implications for power dynamics between the state and central governments around water and makes its governance highly political in nature. This can be seen at local levels where people running for office may buy a water tanker for a village. Participant 29 noted this saying, "[D]uring the elections you would hear people driving around… well… 'want-to-be' politicians driving around for votes… [S]ome of them would buy a tanker for the village or whatever or the community in exchange for their support," which shows the use of water as a political tool at local levels. It can also be seen at national levels where recently a politician ran on the platform of making water free. This is evidenced by the numerous water tribunals that have taken place in recent years which issue Supreme Court rulings on inter-state water disputes (D'Souza 2002; Saleth 2004) as well as accompanying civil unrest at such rulings (Gleick et al 2009; Najar 2016).

The second normative feature that is important internally in India is the marginalization of certain groups, including based on gender, age, cultural heritage, education, and caste. Using the caste system as an example of marginalization, discrimination based on the caste system is illegal in India (Bakshi and Kashyap 2011), but it is still very visible and culturally pervasive today, especially considering water (Ghurye 1969; Mehta 2007). Because water is considered purifying and sacred in many religious and philosophical traditions, historically one's position in the caste system dictated which water sources they could collect from and which groups could share water sources (Ghurye 1969; Birkenholtz 2010). This is still seen in the way the caste system divides groups around the subject of water and is an important normative consideration to highlight. Participant 20 further supports this in their interview, saying,

> Suppose you have a high caste, he will not allow the lower caste to collect water from his water tap, from his water source. So the poor fellow has to go to some other source, maybe lower or somewhere… [W]e have a very strong caste system where higher castes will not allow the lower castes to touch [their water sources], and the lower castes will not allow the still lower castes to touch, and so on.

Participant 20 described this giving an example where the "lower castes" were forced to collect water "from the field… with pesticides and fertilizers," showing the connections between the caste system and determination of access to clean water. While this discrimination is against the law, it is apparent that it exists in social practice and has implications for larger institutional trends as power structures are still deeply tied to caste in India (Hardgrave 1993; Vaid 2014; Hoff 2016). Further examples of marginalization can be illustrated using the other dimensions like gender (Haq 2013), age (Islam

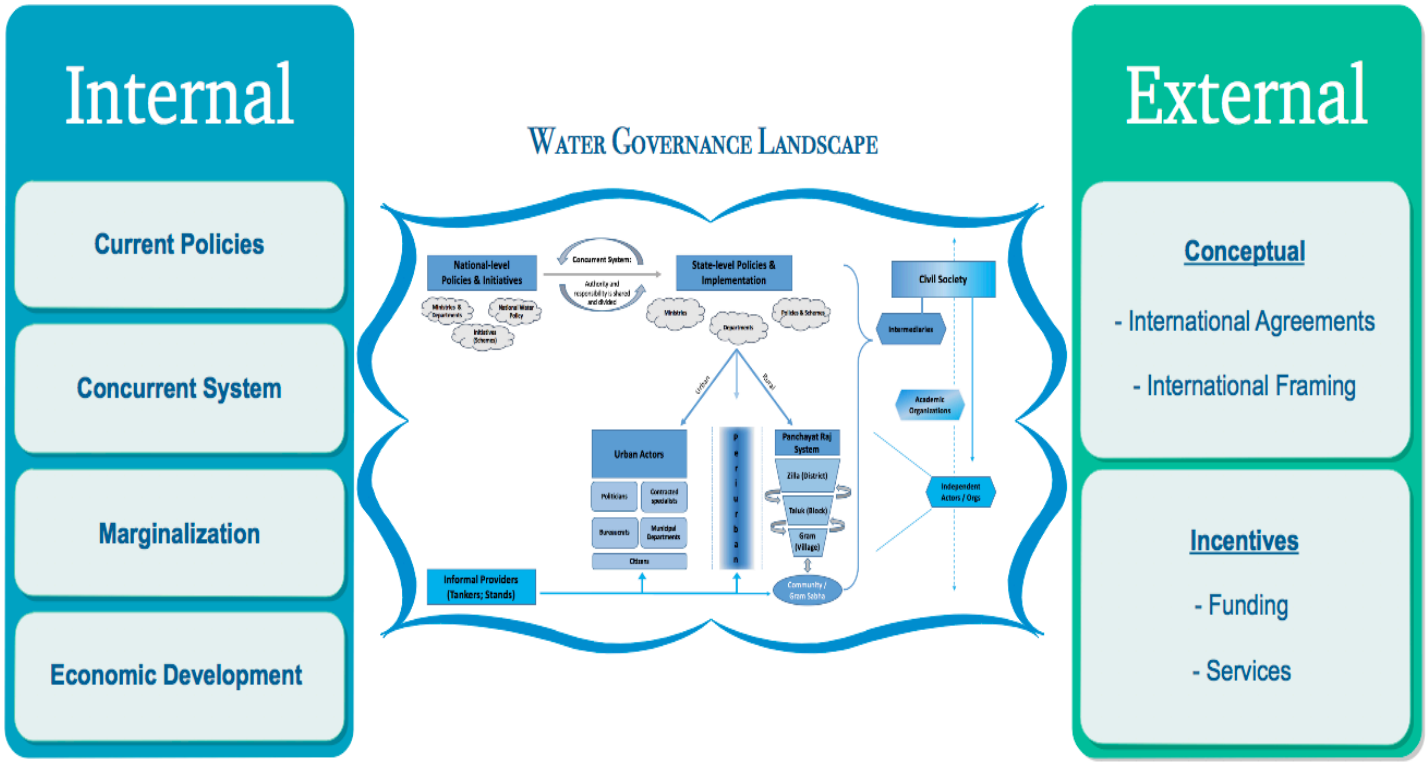


Figure 4.4 – Normative Map: Water Governance for SDG targets

2014; Jose and Cherayi 2017) cultural heritage (Hardgrave 1993; Deshpande 2000), and education levels (Mehta and Shah 2003), but the examples given from the caste system parallel the broader social and institutional practices of marginalization in India.

The third internal normative feature is economic development. Because economic development is so prioritized in India on the national agenda, cost-benefit analyses and other forms of weighing the economic benefit of decisions often come into play with water (Drèze and Sen 2013). For example, ecosystem health is often compromised in India where economic gains are favored, as seen through exploitation, resource development, and industry (Parasuraman 1999; Saleth 2004; Drèze and Sen 2013). These three internal normative factors all in turn influence the way water and actions on water-related outcomes are prioritized, planned for, and addressed. This important because this translates into implications for and pressure on water governance and management.

4.2.4.2 External

There are also external normative features, which can be broadly summarized in the categories of 'conceptual features' and 'incentivizing features'. Considering first the conceptual domain, there are two main external normative features at play: international agreements and the international agenda. International agreements are myriad, but it is clear they influence the way water is governed in India. For example, much of the language in Indian water policies includes reflections of international agreements including the Sustainable Development Goals (Shah 2013), which is indicative of the normative effect these agreements have on the way water is governed in India. Participant 7 affirmed this saying, "Most of the national policies and the national level programs are intended to look at the global perspectives also. We had the Accelerated Rural Water Supply Program in the country. That's again aligning with [the] Millennium Development Goals." The other conceptual feature is the international agenda. In a similar way to international agreements, the international agenda influences water governance in India through framing desirable water governance processes and outcomes. This can be seen in initiatives to push IWRM specifically (Shah and van Koppen 2006), as well as a more general interest within India to do what's considered 'in' or popular on the international agenda. Participant 28 reflected on this normative feature, saying, "Every day a new policy is brought… So at one point watershed, watershed, watershed, watershed was a big agenda… By the time people internalize this and try to apply or roll it out on the ground, something else happens and then that's come in the way." Participant 7 also observed, "We do definitely have

national targets, but… there is a very strong connect [with the international agenda] and I think the international pressure also works on the government." As such, both the impacts of international agreements and agendas influence the way Indians think about and govern their water. Moving beyond the conceptual realm, there are other external normative features that involve incentives. The most obvious incentive is funding or investment which can constitute large sums of money and has an effect on water governance. This can be understood through the many caveats and requirements that must be met in order to receive funding (Lele 2000, 4; Goldman 2007). Additionally, incentives can encompass other services like capacity development (Fukuyama 2005) or allowing involvement in certain networks (Fukuyama 2005; Goldman 2007). Overall, these incentives and conceptual features have a clear external normative influence on the way water is governed in India.

4.3 Discussion

This chapter has helped to create a more systemic assessment of the structure, functions, and normative dimensions of water governance in India. These areas will allow for the trends and issues explicit to certain scales or contexts to be given voice and furthermore provide preliminary insights into enhancing the achievability of SDG 6 targets in India. Beyond a general understanding of water governance for SDG 6.1 and 6.2 in India, many specific considerations and trends are revealed from this structural, functional, and normative examination. This includes, (1) gaps in periurban water considerations, (2) the broad role of civil society, (3) disconnects between the WGL and recommendations from water governance literature, and (4) prospects for SDG 6 achievability.

First, there is an obvious gap surrounding periurban spaces. The periurban space is a very visible gap in the water governance system as water access is an issue (Allen et al 2006b), but this is not just a gap in service provisioning. It is also gap in representation within the formal institutions and rule-making systems, as noted in the structural discussion of periurban spaces above. While there are efforts being made to account for the situation of periurban spaces in a rapidly urbanizing country (Allen et al 2006b), the structure and functions of the water governance system leave periurban populations underserved and underrepresented (McKenzie and Ray 2011; Prakash 2014).

Second, the scope of civil society functions as mentioned in the functions discussions is quite broad because civil society is seeking to serve as the connecting entity around the disconnects these groups have observed. When looking at the structural or functional maps, it is observable that civil society is involved throughout the entire water governance landscape. While civil society is important in their roles, their broad scope of influence and their many functions can be understood as symptoms of larger disconnects. Most notably, the functions civil society serves that are not mentioned in any other category – consultation, education, capacity building, planning, study & research, and innovation – should be highlighted as areas where disconnects may be happening or create susceptibilities. This is particularly important as much of the literature highlights the need for these functions like education, capacity building, and planning for successful water governance, as well as the sustainability of projects (Shah 2013).

Third, the examination of the WGL in India shows a disconnect between the need for collaborative water governance explored in Chapter 2 and the way water is generally governed in India. This is made clear through comparing the calls for 'collaboration' from the literature and the hierarchical, top-down way the Indian government pursues SDG 6.1. The hierarchal nature of the government structure makes a disconnect in multilevel feedback. This is shown on the water governance landscape map, Figure 4.1, with arrows at the central and state levels mainly moving in one direction, from top to bottom. There are few mechanisms for lower tiers to provide feedback up the ladder, particularly within the state structure. This is additionally amplified by the fact that departments and ministries are often creating policies and programs without consulting one another laterally (Shah 2013), creating issues around isolation between departments and ministries which results in working in silos. This again is problematic given the water governance literature and SDG 6 targets call for collaboration and concerted action (Cronin et al. 2014; Giordano and Shah 2014; Pahl-Wostl 2015; Woodhouse and Muller 2017). It should be recognized that there have been laudable efforts to improve collaboration on some issues, such as the process for the formulation of the National Groundwater Policy (Aguilar 2011) including open calls by the national government for feedback on the water policies, but these efforts have not translated into established paradigms in the governance arrangement and therefore are not reflective of the system trends at large.

There is a general agreement that there has been progress surrounding many of the SDG 6 targets, supported by statistical data on water access (WHO and UNICEF 2014), as well as some observable changes and improvements in processes around water governance and management (Shah 2013; Cronin et al. 2014). While this is a promising trajectory, it is also situated in a reality where India's population is expanding and the uncertainty surrounding climate change increases uncertainty around water in particular (Cronin et al. 2014). This demands more resilient systems in order to keep making headway on SDG 6 targets and even in recognition of the progress, constitutes major road blocks that must be considered (Cronin et al. 2014). By understanding and examining the water governance landscape, the current ability of the water governance landscape of India to facilitate achievement of SDG 6 targets can begin to be examined. While this chapter details the structural, functional, and normative aspects of the water governance landscape, it is important to understand that this alone does not constitute a complete assessment of whether the system is poised to achieve SDG 6 or not. Understanding the structure, function, and normative features to the water governance landscape does provide an entry point from which to better observe and understand the water governance system.

All these considerations have implications for whether or not the water governance landscape is poised to actually achieve SDG 6. It is clear from exploring the water governance landscape, as well as the corresponding gaps and disconnects that SDG 6 achievement is likely not possible with the current state of the system. This is made particularly clear by the lack of provisioning and representation for periurban areas, which would make universal access to clean water and sanitation (SDG 6.1 and 6.2) a non-starter under this system. While civil society does its best to fill gaps and address disconnects within the system, there are other notable reasons that SDG 6 achievement is unlikely with the status quo of the water governance and management system, including but not limited to numerous social, cultural, and political power dynamics at play, as well as the larger climatic trends that are not considered currently in the water governance landscape.

This chapter looked at the water governance landscape in India, detailing the structural, functional, and normative dimensions. Overall, while there are promising trends toward change in the governance of water in India, the WGL is not poised to achieve SDG 6 and leaves room to investigate how the WGL can be shaped to better facilitate SDG 6 achievement. The next chapter will provide

further insights into the specifics of how to go about moving India toward a more sustainable water future through exploring multi-level experiences in water governance and management. Considering the gaps and disconnects from assessing the water governance landscape in India, there are four focus areas which can provide clarity and value to this inquiry: (1) participants relationships to water projects, management, or governance, (2) perceptions of the water governance landscape, (3) enabling and hindering factors for SDG 6 targets, and (4) human-environment connection (SES). Area 1 will clarify where participants are situated within the water governance landscape. Area 2 will enhance the understanding of the structure, function, and power dynamics at play in the water governance in India. Area 3 will highlight a suite of important factors for the governance of water from instances of success and challenge. Finally, Area 4 will allow for a more nuanced view of how human-environment connections or disconnects may be influencing SDG 6 achievability.

CHAPTER 5

Key Trends and Factors in Multi-level Experiences of Water Governance for SDG 6 Targets

Table 1.1 – Research Objectives

Objective 1	To explore and analyze the existing water governance mechanisms (institutions, instruments, treaties etc.) that can either facilitate or impede water governance at multiple levels with attention to the SDG 6 on water
Objective 2	**To capture multi-level experiences around success and failure in water governance for SDG 6 targets, especially key factors contributing to and/or hindering SDG 6 achievement**
Objective 3	To synthesize insights and suggest ways in which existing governance mechanisms can be further strengthened on multiple scales in relation to SDG 6

5.1 Introduction

This chapter will explore the perspectives of participants in semi-structured interviews and focus groups. We learned in the last chapter from reviewing the structural, functional, and normative dimensions of the water governance landscape that there is a mismatch between the water governance landscape in India and SDG 6 achievement. While information and findings in Chapter 4 are important to recognize and learn from, it is also essential to recognize that examining the water governance landscape at such a high level may be mismatched with the day-to-day realities of water governance for SDG 6.1 and 6.2. Individual perspectives can bring the realities of both policy and practice to life further, cross-validating the conclusions from Chapter 4. Additionally, the conceptual framework presented in Chapter 2 identified four potential criteria through which to assess and enhance water governance for SDG 6.1 and 6.2. This chapter will also investigate if these four criteria are the most salient in this context or if there are other emergent criteria which should be used to better understand and enhance SDG 6 achievability.

In order to validate the conclusions in Chapter 4 and clarify criteria for assessing and enhancing SDG 6 achievability, data was gathered using semi-structured interviews. The questions in

the semi-structured interview guide (Appendix C & D) were around four major substantive areas: (1) participants' relationship to water governance, (2) perceptions of the water governance landscape, (3) enabling and hindering factors for SDG 6 targets, and (4) human-environment connection (SES) in water governance. The first two focus areas connect most closely to cross-validating conclusions from Chapter 4 and the latter two focus areas connect most closely to criteria for assessing and enhancing SDG 6 achievability.

Participant perspectives are explored by grouping the interview participants into three major scale-based groups – micro, meso, and macro – and through noting both their collective experiences, as well as individual perspectives. Responses for each of the four substantive interview areas are explored separately. There are also comparative observations made on similarities and differences within and between the micro, meso, and macro groups. The make-up of these groups is summarized in Figure 5.1 below.

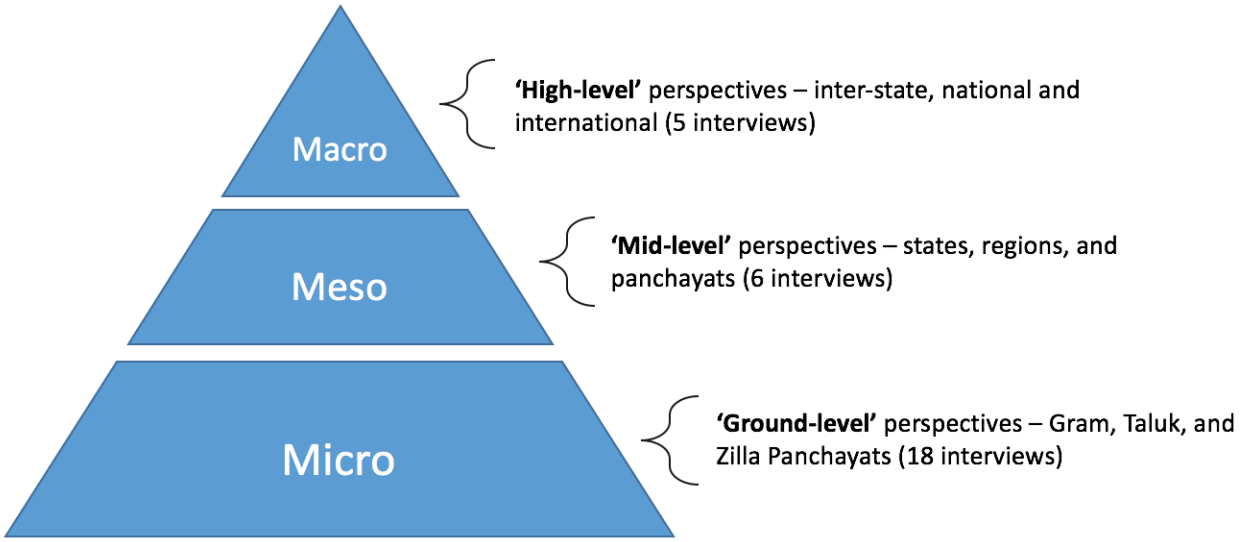


Figure 5.1 – Semi-structured Interview Participant Groups

Broadly, the intensity of interviews corresponded to the size of the different groups in order to try and capture representative data. While Figure 5.1 summarizes the different participant groupings, each group is also profiled in detail in Chapter 3, Section 3.2.2.

5.2 Insights from the micro level

5.2.1 Doddaballapura Block – Thirumagondanahalli Village

The following section focuses on the case study from Doddaballapura and the National Rural Drinking Water Project (NRDWP). Background on the case study was detailed in Chapter 3.

5.2.1.1 Participants' relationships to water governance

When asked about participants connection to the NRDWP water project, most participants expressed no connection to the project beyond being an end-user of the water infrastructure. Often, participants had to be prompted to which water infrastructure was connected to the NRDWP project, expressing no connection before and only minimal connection after being prompted. When asked about the central government water project, participant 5 said, "No, we have not had it installed… In other villages they have implemented, but not in our village." In another interview, the research assistant explained, "[T]hey have installed mini water schemes where they have put four taps for one tank," to which Participant 21 responded, "That's been done from our panchayat. Where does the central government come into the picture? [Funds are] from the state government. Funds are given by panchayat. The funds to the state government may come from the central government, but which I am not sure." This illustrates the expression of minimal connection to the project itself, as well as a lack of full understanding of the funding sources. This was true for village residents as well as local political officials and indicated a general disconnect from the formal aspects of the water project, like the name of the program and the funding sources. Where connection to the project was expressed, it was mainly by participants being end-users. This is exemplified by Participant 22's response to how community members are involved in the NRDWP project, saying, "There is not much involvement of the people. If drinking water is provided for people, that's finished." While participants expressed little connection to the project, they were all familiar with the infrastructure and resided in Thirumagondanahalli before, during, and after the implementation of the NRDWP project. As a result, all participants were intimately familiar with the informal aspects of the project such as the infrastructure that was built, who was in charge of the project, the implementation / building process, how they use the infrastructure now, and operations & maintenance.

Considering participants' connection to water management and governance more generally, one aspect of note is that participants did identify their participation in political processes surrounding

water issues such as voting and informal lobbying which constituted a form of participation in water projects in their community. When asked about community participation in the water project processes, Participant 3 said, "Where ever such central government schemes are provided, we *ask* them to provide water for our village." This was further supported with Participant 22 saying (emphasis added), "If there is problem for drinking water, they *complain*. After that they won't *raise any issues* until they face problem again," demonstrating that asking or complaining is considered a form of participation. Numerous participants expressed this form of participation in connection to raising their voice and thus, this constituted the only major form of connection to the NRDWP project from participants' points of view.

Because this was the major form of connection to water governance and management expressed by semi-structured interview participants in Thirumagondanahalli, I decided to explore perceptions of community participation in the water governance landscape at the community level in a focus group. Participants highlighted the roles of voice, voting, and financial contributions as forms of participation, identifying especially raising your voice as the "only way to get things done" and in and of itself being "almost like voting". Not everyone financially contributes to water causes or votes in the community, but unanimously participants in the focus group used voice as an informal kind of participation. Additionally, participants unanimously agreed that more formal avenues for participation would be desirable, like the establishment of a Village Water and Sanitation Committee (VWSC) in their community where more people could be involved in education, financial oversight, and general decisions around water.

5.2.1.2 Perceptions of the water governance landscape

In Thirumagondanahalli, the participants made numerous observations surrounding the structural, functional, and normative aspects of the water governance landscape.

Structurally, the community perceived panchayat members, the panchayat president, the Panchayat Development Officer (PDO), and the bureaucracy (engineers) as the major players in the water governance landscape. This highlights that at the micro level, the structure of the water governance landscape is perceived as state- and panchayat-focused, but also very hierarchical. This was supported by participants naming the people involved in water governance and management either from the top-down or bottom-up of the hierarchy. When asked about who is involved,

Participant 23 said, "The people will ask the panchayat member, in turn the member will take the issue to upper levels like to Taluk or Zilla panchayat. These people will take the issue to the higher authority officials and see to get the bore drilled where there is scarcity of water." This describes the levels of Panchayati Raj from bottom to top and further illustrates the hierarchical perception of the structure.

Functionally, participants highlighted the power of the panchayats in water governance and management processes. This was especially communicated through highlighting the power of the panchayat development officer (PDO) who work at the taluk level, as well as the flow of authority and responsibility across the levels of panchayat. The PDO's functional importance in decision-making was communicated by many interviewees. Participant 22 said, "When the drinking water project is sanctioned we are not aware if it's a National level or state level scheme… On the whole, it depends on the PDO. The higher-level officer PDO will instruct us." This clearly highlighting the functional importance of the PDO in water governance processes. Participant 24 noted, "We tell members about the scarcity of water. It in turn handovers to panchayat stating the problem of drinking water… so the concerned people in panchayat and PDO will take the decision," further highlighting the role of the PDO. The more general observation the authority and responsibility moves up and down the Panchayat Raj system was also made clear. This was particularly done through participants repeatedly noting the way one level of panchayat raj will ask or consult with the next higher level until a decision can be taken and the implemented going back down through the panchayat levels. Functionally, this also means that water governance can be a slow process as questions, information, and decisions move up and down the rungs of the Panchayat Raj ladder.

Considering the normative features, participants in Thirumagondanahalli did not overtly explore any of the normative aspects detailed in Chapter 4, however an emergent normative feature was revealed during these interviews – namely that water provisioning is the responsibility of the state. When asked about whose responsibility water provisioning is, Participant 1 observed, "Definitely the state government. Sanctioned projects are to reach the panchayat government from the state government in correct manner and the State government is only responsible." Participant 6 also supported this saying, "Yes everything is taken care by panchayat. If pipes are worn out also panchayat takes care of it." The perception that the national and state governments should bear the responsibilities in policy, planning, funding, and implementation surrounding water for citizens is

important to understand as an underlying feature of the water governance landscape in India. This is also important because it has implications for the level of participation of communities if the responsibilities of water provisioning are perceived to lay with the government. Participant 22 aptly summarized, "[The community members] come to the panchayat and won't go beyond this level to ask for water," highlighting a disconnect between the ground-level needs of communities and the government responsible for meeting water needs.

5.2.1.3 Enabling and hindering factors for SDG 6 targets

Participants were asked to detail what they thought contributed to the success of the NRDWP project (enabling factors) and what they thought were challenges (hindering factors) in the process. Table 5.1 below summarizes all the observations from participants in Thirumagondanahalli village.

For the enabling factors, there were 16 identified from semi-structured interviews with participants in Thirumagondanahalli. Notably, these enabling factors concerned themes like communication, education, planning, and technocratic solutions. Turning to the hindering factors, there were 21 identified in Thirumagondanahalli interviews. These hindering factors concerned themes surrounding specific problems around infrastructure function, bureaucratic and institutional delays, and social status including gender and politics.

Surrounding both enabling and hindering factors, there are numerous focus-areas or topics that arise including challenges, the role of technocratic factors, interactions amongst people or departments, and knowledge. It is easy to see that there were more hindering factors than enabling factors identified, with 21 hindering factors and 16 enabling factors. This is of note because it shows how diverse and numerous the perceived challenges are at the micro level from the point of view of the community members in Thirumagondanahalli. Other general observations include a thematic focus on technocratic, end-of-pipe factors such as 'reverse osmosis systems, infrastructure, river interlinking projects, and equipment.' This shows the perception of importance placed on technocratic factors in relation to both enabling and hindering factors.

Additionally, there are several enabling and hindering factors that relate to individuals or departments and the interactions amongst them as well as their interactions with the community. This is exemplified through the factors like 'quality individuals, pressure on elected officials, bureaucratic

overlaps, egos, and slow response of institutions,' among others. This highlights the number of people involved in the processes of water provisioning and the perceived importance of the interactions amongst them. Finally, many of the enabling and hindering factors also focused on the importance of knowledge, such as 'awareness of water issues, training & education, knowledge of the schemes, and knowledge transfer.'

Table 5.1 – Enabling and Hindering Factors: Micro, Thirumagondanahalli

Micro-level Perspectives – Thirumagondanahalli Village	
Enabling Factors	**Hindering Factors**
• Awareness of water issues • Citizen pressure on elected officials • Communication between community members • Good elected officials (intentions and capacities) • Having a vision (goals / future to work toward) • Knowledge of the schemes • Knowledge transfer between community members • Land-use planning • Listening to community voices • Reverse Osmosis systems (improve quality) • Planning for future generations • Pressure from local representatives on higher officials (elected or bureaucrats) • River interlinking (for surface water sources) • Training / educating community member about water resources & scarcity • Water conservation knowledge • Water infrastructure (recharge pits, check dams, enhanced lake storage, etc.)	• Accounting for 'nature' • Acting on policies ('follow through') • Bureaucratic overlaps and disconnects in jurisdiction • Egos getting in the way • Electricity dependent access • Gender relations • Information sharing is slow • Lack of clarity in funding sources • Lack of equipment for data gathering • Limited data (i.e. real LCPD, status of bore wells, etc.) • Lots of room for corruption • Operations & Maintenance lies outside the community capacities • Political cycles • Private ownership of bore wells and land • Quality assurance • Rigidness on how funding can be spent (i.e. need recharge pits but can only dig bore wells) • Scheme complexity (sheer number, overlaps, clarity, funding) • Slow response of institutions (for funding and action) • Source sustainability of groundwater (sufficient quantity; seasonal variability) • Time (takes too much time, but needs are now) • Voices of the poor aren't necessarily listened to / considered or valued

5.2.1.4 Human-environment connection (SES in water governance)

The questions surrounding human-environment connection or social-ecological systems were hard to explore in Thirumagondanahalli. This was in part due to the fact that not many participants understood the questions surrounding this topic, which required extensive prompting, rewording, examples, and overall discourse.

There was however a clear connection expressed between the ways quantities and qualities of water affect quality of life and human health. The impacts on humans were observed by participants, but mentions of impacts of human activities on water resources were not reflected in the semi-structured interview data. Participant 2 said, "Without water, humans can't live," to illustrate the effect the environment can have on humans as a necessity of life. Participant 21 went further saying, "The government has made check dams so that the water is stored in it without flowing out. Because of this, we are getting a little more water, so if such check dams are constructed more, then it will be good to conserve water." The participant's observations highlight how having more water is beneficial and advocates for more development, but disregards the negative ecological impacts of building check dams and decreasing water flows. These quotes overall illustrate how the perception of human-environment connection in Thirumagondanahalli is mostly one-directional with ecological systems positively or negatively impacting social systems. When asked directly about the negative environmental effects being observed from human consumption of water, specifically the rapidly decreasing groundwater levels, Participant 22 observed, "The officers won't consider these facts. They are meant to finish their work and submit to the concerned authorities. Even we will consider the same since our main motto will be to get water. If one bore fails, we don't see why it failed. Instead we look for another point for the bore to be drilled." This is demonstrative of the ways in which the water governance arrangement in India at the panchayat level may not be in line with the social-ecological systems thinking that the SDG 6 targets highlight as necessary to achieve a sustainable water future.

5.2.2 Mulbagal Block

The following section focuses on the case study from Mulbagal block and the Water Security Pilot Project (NDWSPP). Background on the case study was detailed in Chapter 3.

5.2.2.1 Participants' relationships to water governance

In Mulbagal, all participants in semi-structured interviews identified as directly connected to the NDWSPP. While the expressed level of connection to the NDWSPP varied from being a participant to being deeply involved in the implementation of the project, connection to and involvement in the project was unanimous. Participants' relationships to the NDWSPP included participation in the trainings and planning events, panchayat officials, Village Water and Sanitation Committee members, community mobilizers, and facilitators.

5.2.2.2 Perceptions of the water governance landscape

Perceptions surrounding the water governance landscape were mostly related to structural and functional features.

For observations on the structure, participants highlighted hierarchy and community involvement. Participants repeatedly described the rigid hierarchical nature of the water governance system, particularly focused on the Panchayati Raj system. This is illustrated by Participant 13 description of who's involved in water governance, noting, "If it's local, then it's the ZP or TP. If it's not local, it's the state government or central government." The participant continued, "The local elected bodies from ZP or TP or the local MLA. When they receive the complaints about the scarcity of water, they see that at such places what can be done," which further highlights the panchayat's role and the different levels. While this focus on the hierarchy in water governance was notable, participants also perceived the communities' involvement as foundational to structure. When asked about if community members were involved, Participant 17 stated, "Yes people used to gather and discuss in the meetings," and Participant 11 elaborated, "Each village will have a member, they will discuss with their villagers and tell it in the committees then the President, PDO will take the decision in front of the members as how to solve this problem." These highlighted the role of community involvement in water decision-making. There was also community involvement through trainings. Participant 16 noted the involvement of the community in the processes, reflecting, "Whenever and whatever time, we called for meetings to create awareness. They used to support by participating and making the meeting effective." The expressed connection between the formal involvement of the community and the sustainability of projects at the ground-level demonstrates the importance participants put on community involvement throughout the NDWSPP.

Turning to function, Mulbagal community members highlighted the function of NGOs as intermediaries across the hierarchical government structure. Outside of the formal bureaucratic and government processes that were discussed as functions, many participants directly iterated the importance of the implementing NGO in the NDWSPP process. Participant 14 highlighted this saying, "Compared to when we went through NGOs, the response from government officials was less. If we suggest them they never heard and did their own. Example, we gave letters stating that meters are not connecting properly but we never got any response. So if implementation process is given to NGOs, it may be good." This was further supported with Participant 16 noting, "After the project comes, [the NGO] takes the initiative for the work to be done in a proper way… If there are any schemes, they used to communicate with people in a very effective way. So the NGO role is main." Participants' value of the NGO intermediary in Mulbagal was widely recognized, especially in comparison with the regular avenues of government.

No normative observations around the water governance landscape were observed or discussed.

5.2.2.3 Enabling and hindering factors for SDG 6 targets

Semi-structured interview participants in Mulbagal identified numerous enabling and hindering factors, detailed below in Table 5.2. There were 15 enabling factors identified, which included themes surrounding community involvement, knowledge and education, water resources, and technocratic considerations. There were 6 hindering factors identified which involved challenges around the institutional structure, nature, and community members' financial participation in water provisioning and services.

Considering general observations, it is interesting to note the heavy concentration of responses that fell into the 'enabling factors' column. When looking at Table 5.2, it is easily observed that the majority of responses surrounding enabling and hindering factors fell into the enabling category. Participants in semi-structured interviews made many observations around what they thought contributed to success during NDWSPP, but required prompting to reflect on the challenges. Participants generally perceived very few challenges throughout the implementation of the NDWSPP, but it should also be noted that site visit observations indicated that some of the infrastructure from the NDWSPP had fallen into disrepair or been removed. When asked specifically about this, it was

indicated that insufficient quantities of water and changes in the level of the groundwater table attributed to general changes in climatic patterns had rendered some of the infrastructure unusable. It is important to note then that while the implementation of the NDWSPP was perceived very successfully, the hindering factor of changing climatic patterns in particular was detrimental to the functionality of some of the NDWSPP infrastructure. This is a potent example of why the hindering factors matter so deeply, as one hindering factor can impede the success of a well-designed and implemented project. Even so, participants focused on highlighting all the aspects of the NDWSPP project that were still functioning well and their perceptions of the benefits it brought to water provisioning in Mulbagal.

Table 5.2 – Enabling and Hindering Factors: Micro, Mulbagal

Micro-level Perspectives – Mulbagal Block	
Enabling Factors	**Hindering Factors**
• Accountability of community members (compliance on behavior or money) • Citizen pressure (complaining, saying what's going wrong, letter campaigns, protests, strikes) • Community involvement in decision-making processes • Considering future generations • Context-specific solutions • Issues and water conservation awareness • Knowledge in general • NGO involvement • Proper maintenance • Recharge pits • Sufficient funding • Trainings on water resources (how they work and connections to / implications for humans) • Use of Gram Sabhas (more often, more inclusive) • Village Water and Sanitation Committees (VWSCs) • Water conservation built into policies / programs	• Changing climatic patterns • Quality assurance • Room for corruption • Slow bureaucratic processes (especially for funding mobilization) • Unresponsive people in higher levels of Panchayat Raj (Taluk & Zilla) • Willingness to pay water tariffs

Other thematic areas of the enabling and hindering factors included community involvement, learning and trainings, and sustainability. Participants highlighted the role of community members in

the implementation process with factors such as 'accountability of community members, citizen pressure, community involvement in decision-making, awareness of issues, trainings, use of Gram Sabhas, willingness to pay,' and more. These demonstrate the perceived importance of the role community members have to play at the micro level during the NDWSPP process. Additionally, the importance of education was mentioned repeatedly, as seen in factors like 'trainings, knowledge in general, issues and water conservation awareness, and proper maintenance.' These factors highlight the value of empowering community members with both knowledge and capacities through education.

Sustainability was another interesting theme reflected in the factors such as 'considering future generations, context-specific solutions, water conservation awareness, proper maintenance, and recharge pits.' It is interesting to note that perceptions of enabling and hindering factors surround these sustainability aspects engage with many different sub themes as well, but definitely show sustainability as a concern from both a social and an ecological perspective. This can be seen with factors like recharge pits and changing climatic patterns relating to ecological systems, with factors like proper maintenance and water conservation awareness relating to social systems, and factors like considering future generations and context-specific solutions as relating to both social and ecological systems. This can also be connected to the recognition of adaptiveness needed in policy and implementation processes, seen through factors like 'water conservation built into policies / programs.'

5.2.2.4 Human-environment connection (SES in water governance)

Throughout semi-structured interviews and informal site visits, participants in Mulbagal explicitly communicated about the importance of the human-environment connection surrounding water. This is exemplified in a quote from Participant 14 who reflected, "We planned 55 litres per day for per head and created awareness among the people in the water budgeting. If we consume whatever water is there, then it will be a problem for the future generations. We keep land for future generations. They can live without land, but they can't live without water so we need to save water." It is important to note as well that this recognition of a human-environment connection was expressed by all different types of participants, including community members, mobilizers, and panchayat officers. These participants connected this knowledge and awareness of the human-environment connection to the implementation process of the NDWSPP which involved educational trainings and

involvement of the community in decision-making. Participant 14 reflected, "Earlier we thought we had plenty of water and we used to waste a lot of water but after the project – it may be either for sanitation or other things – we are using how much ever water its required. We realized that water is more valuable. We can stay a day without food but not without water. The main importance should be given to water." This shows the importance of education in recognition and understanding of the human-environment connection surrounding water.

Participants showed a capability to think through the complex interactions, both positive and negative, between social and ecological systems. When discussing the benefits of sanitation, Participant 14 said, "Earlier [the community members] used to go in fields for sanitation. Because of this, what all diseases they will suffer from was taught in trainings. Now [the community people] have realized the connections so now [sanitation] is effective," which demonstrates an understanding of the interplay between social and ecological systems. Additionally, participants communicated other factors within the social systems of their community at play impacting water governance, such as water waste. Participant 17 reflected on the importance of awareness saying, "We used more water before. Water used to flow in gutters every morning and evening and got wasted. After they fixed proper taps and meters and trained us how to use water in proper way we have now realized to save water and we do convince the neighbors also to fix taps." This recognition of the interplay between human activities and water quality and quantity is likely because the NDWSPP process included training around understanding water conservation. Recognition of the role of the NDWSPP training for understanding human-environment connection was noted by participants. When asked about what the learned about water resources, Participant 13 said, "Why there is depletion in the underground water. What needs to be done to improve the underground water. When water is there how to utilize. How to store water for future when there's more," showing the topical outcomes of the trainings. Participant 12 more explicitly observed the importance of the trainings saying, "Before the project was implemented... discussions were done at ward or gram panchayat people never used to attend, even if they attended they never used to bother. But after the three days training they realized the necessity of water and its usage and how to save the water for future generation." This demonstrates the importance of the NDWSPP process itself in establishing an understanding of human-environment connection through water resources in Mulbagal.

5.3 Insights from the meso level

At the meso level, no particular project was used to focus the semi-structured interview questions as was done in the micro-level interviews. This is because these participants had enough experience in water projects, management, and/or governance to answer questions without being bound to a single experience. This allowed space for participants to draw upon a range of experiences from all over India rather than limiting their responses to one instance or scheme. This made the data richer in variety and helped encompass experiences from outside Karnataka as well to create a more holistic picture of water governance and management at the state level and down.

5.3.1 Participants' relationships to water governance

Meso-level participants when asked about their relationship to water projects, management, or governance mainly identified in association with civil society (NGOs and researcher), government contract work, and community engagement. Participants work multi-directionally from their positions, vertically with larger institutions and small communities, as well as horizontally with other NGOs and academic institutes. This is also interesting to note in the context that the meso-level interview data reflects individuals' historical experiences with the water governance landscape, their observations of change overtime, and their perceptions of the direction it is heading.

5.3.2 Perceptions of the water governance landscape

The questions surrounding perceptions of the water governance landscape during meso-level interviews referenced observations around the structural, functional, and normative spheres explored in Chapter 4.

Structurally speaking, this participant group's observations focused on the formal government structure of the water governance landscape, particularly on the 'state-level' with panchayats and urban areas, as well as the more informal roles of civil society in the system. First and foremost, there was agreement across all participants that there are a lot of different entities involved in the water governance landscape. Participant 29 observed, "[T]here are so many people involved in water – so many different separate institutions." This was further supported by Participant 26 noting, "[T]here are about half a dozen departments and programs and their directors and the down-line who takes decisions or makes policies, etc. etc." Surrounding civil society, there was also a general recognition

of civil society bodies as informal yet important pieces of the water governance landscape. Participant 27 observed,

> What has also happened over the last at least 4,5 years is that the participation of civil society organizations like NGOs and people working on the ground, [are] becoming much more active in the policy circles themselves. So, a lot of organizations that we work with within our team of a couple people have been party to this consultation process which has actually led to [progress]. As long as that happens, we realize that these policies are actually reflecting the challenges on the ground,

showing the importance of civil society as a structural presence in the water governance landscape and also perhaps a transition to a more formal structural presence in higher-level processes around water governance.

Functionally, there was a consensus that the multitude of actors or entities in the water governance landscape create problems through the presence of silos and a disconnect from ground-level experiences. Looking at the presence of silos, Participant 29 noted the many people involved in water as "separate institutions," highlighting the perception of isolation from one another and functions that are not coordinated. Furthermore, Participant 26 commented, "[I]nitially I was only looking at the communication functions... But [change] cannot happen in a desired way unless some things within the government systems also change," further contextualizing the need for change around communication in government systems. This isolation is not just noted amongst the institutions, but between the institutions and the end users. Participant 26 continued to make an interesting observation around the function of these numerous entities involved in water governance and management, saying, "But sometimes I feel it's not good because they're quite not clued in with how things work on the ground," signifying another level of disconnect and functional silos.

Both structurally and functionally, it was noted that the situation differs by state because of the concurrent system. This means there is a presence of different institutions involved in water governance from state to state, often with different functional mandates and bureaucratic processes. This is highlighted by Participant 19 who observed, "[W]hen it comes to water, the state can say this is the needs of our people…" This was further support by Participant 26 who said, "So that's the way it is in [one state], but again it's different in different states. In some places, you have a district

magistrate who is responsible for law and order and some other things and then the collector is responsible for these development works as such."
While different states have different institutions, participants' experiences across different states uphold that the structural and functional perceptions explored above are more general observations that hold true from state to state.

Considering normative observations, the meso-level participants all seemed to agree that the water governance landscape is in a transitionary period where it is moving toward better policy and practice. Participant 27 affirmed this about water governance in India saying, "[T]here is a positive move is what I would say." Participant 26 elaborated on this sentiment, saying, "And I think that gradually, the government itself has opened up in terms of trying to strengthen its own processes, widening its own thinking, joining hands with whoever has the funds or a better way to do it, innovating, experimenting. They're at least way more open now I think, so that's a positive." Participant 19 connected this sentiment of being in transition to the ground level as well, saying, "[The] understanding that [water] is a resource that needs to be conserved before it is consumed and looking at its sustainability and how much water is available to be used as a resource… is still in its early stages and I think that's one challenge which can be dealt with," highlighting that there has at very least been some progress and that the transitions should continue to be addressed. Participant 19 continued, "So over time I think there is improvement in the understanding as well as the action and this is my general feeling of how agencies have functioned over time. And there is a lot to sort of improve on – a lot of aspects in which they can improve – and hopefully they will." While the participants may differ in their opinions on the degree to which the water governance system is under transition, they all expressed agreement that the movement is happening and is positive.

5.3.3 Enabling and hindering factors for SDG 6 targets

There were numerous enabling and hindering factors identified by meso-level participants which are detailed below in Table 5.3. Note the introduction of a third column at the meso-level that reads "both" as meso-level participants enumerated some factors as factors that can both enable or hinder depending on the context.

Excluding the addition of cross-cutting factors, 29 enabling factors were identified. Broad areas of focus include relationships between and interactions amongst the different actors in the water

governance landscape, as well as the importance of education / training / capacities, and good approaches to implementation. 19 hindering factors were identified with broad focus areas including the realities of implementation, the challenges of the political climate in India, and socio-economic considerations. There were also eight cross-cutting factors that mainly engaged with themes surrounding the interactions between different players in the water governance landscape.

General observations around the enabling and hindering factors include a focus on the practical considerations of implementation, the role of interactions amongst stakeholders, the importance of different uses of power, and the importance of context. Many of the factors identified by meso-level participants connect to the practical considerations of implementing water projects. Factors like flexibility, persistence, nature, and time all connect back to different needs in reference to implementation. Enumerating the 'flexibility' factor as an example, flexibility was identified as an enabling factor because situations often change during the implementation of a project, for example new political leaders with different agendas which then requires the ability to change courses of action. This need for flexibility or adaptiveness can also be in relation to climate as changes in historically reliable climatic patterns require different courses of action. Another focus area at the meso-level includes enabling and hindering factors that relate to the interactions amongst the numerous stakeholders. Factors like 'coordination, involvement of community, ground-level feedback to the top, operating in silos, communication between departments, and relationships / trust' exemplify this trend toward highlighting the importance of the interactions amongst the diverse players involved across the water governance landscape. Another trend is the importance of different uses of power, including political power, social clout, and leveraging of status. This connects to the factors like 'caste system / class differences, international pressure, and quality individuals' which exemplify the role of power dynamics throughout the water governance landscape. Finally, the meso-level participants also highlighted the importance of context unanimously, citing that the social and ecological contexts have to inform the strategies and solutions that are implemented.

It is also of note that the enabling and hindering factors at the meso-level become noticeably more abstract compared to the factors identified at the micro-level. This can be seen in comparing the enabling and hindering factors between the micro and meso participants where micro-level responses are in general easier to be measured like with NGO involvement, proper maintenance, and sufficient funding. At the meso level, enabling and hindering factors take on a quality where factors are less

objectively quantifiable, as understood through factors like 'considering human-environment connections, ensuring equity, leadership, political agendas, and problem recognition and understanding.' Furthermore, at the meso-level, participants even identified 'indicators' as a hindering factor, further highlighting that at this level, the objective measurability of enabling and hindering factors is a challenge. Participant 27 brought even more nuance to this observation, saying, "So the definition of success is also something that will dictate whether we see success or not," further highlights the idea that the way success is measured or observed will change perceptions of achievement. Overall, the topics of measurability, indicators, and definitions of success create a grey-area. This is underscored by the fact that the meso-level carried the most 'cross-cutting factors' in the data set – also a grey area – perhaps a reflection of the middle or "meso" position in the sample.

5.3.4 Human-environment connection (SES) in water governance

Considering observations around human-environment connection, there was general agreement that understanding the human-environment connection is important but considering the community level, there is a disconnect from that understanding. This disconnect is expressed through the factors of 'space to care' and 'education and awareness levels.' Participant 27 explained, "In terms of priorities, there are a lot of other priorities. There are land-use issues. There are education issues." It is further exemplified with a quote from Participant 29 who observed, "I feel that for some people… there's so many other issues to do with urbanization and poverty that the environmental impacts are kind of secondary... [T]here are those who perhaps have achieved a certain level of well-being are [able] to consider the environmental impacts but others [cannot]." This shows the importance of both poverty and education in connection to an ability to establish and care about human-environment connection as understood through water resources. Participant 19 made a more general observation about this trend of disconnect saying, "When we grew up, water did not come out of a tap. Water was fetched. There was a pump and water would come out from the ground. I mean, we knew where water was. One or two generations before us would probably take it directly from the river so in that sense, the understanding of water was there but its availability, quality, abundance was not. So probably that's a challenge now simply because the way development is going." This further highlights the general sense of the disconnect of communities from the environment.

Table 5.3 – Enabling and Hindering Factors: Meso-level

Meso-level Perspectives		
Enabling Factors	**Both**	**Hindering Factors**
• Accountability • Capacity building • Community participation • Considering human-environment connection • Context-specific solutions • Coordinated approach amongst the different managing department (systems approach) • Coordination (teamwork, concerted action) • Decentralized approach • Diversifying sources • Education • Flexibility (willingness to try new things; not completely rigid structure) • Good monitoring • Ground-level feedback to the top • International pressure (political leveraging and funding) • Involvement of community • Involvement of community in decision-making • Knowledge-responsive, science-driven policy • Leadership / Facilitation • Persistence • PPPs • Problem recognition and understanding • Program design (of an intervention / policy / scheme) • Quality individuals (good intentions, capacities, and connections) • Shared Vision • Training • Using community mobilizers • Using 'good' NGOs • VWSCs • Water planning with communities	• Absorption capacity of organizations • Communication between departments • Concurrent system (federal and state jurisdictions) • Education / awareness levels • Ensuring equity • Funding (continuity, sustainability, mobilization, accountability) • Relationships / trust • Scaling	• Access to information • Caste system / class differences • Changing foci (political cycles & agendas; doing what's sexy) • Development changes (urbanization, peri-urban areas) • Gap between intention and reality • Implementation 'in reality' • Indicators • Individuals – corruption • Individuals – poor capacities • Influence of businesses, economic motivations • Lack of community participation (poverty / space to care) • Nature (variability in climate, source quantities, etc.) • Operating in silos • Political agendas • Political cycles • Poverty / literacy • Time (criticality of present needs & quick action, but time intensive process) • Too much responsibility on PDOs • Willingness to pay for tariffing of water

It was also interestingly of note that amongst the participants who had a background in or currently worked for an NGO, they communicated that the goal of most NGOs involved in any sort of water projects with communities is to make the human-environment connection explicit. This striving to create understanding and create space to care through communicating the profundity and importance of the human-environment connection was exemplified by numerous participants. Participant 29 noted, "So I think from an NGO point of view there's definitely a shift toward sustainability in work. [T]here are also other NGOs looking at the social and ecological interactions that affect one another and need to be both considered to achieve sustainability. I really like again [my organization] where they can also work to support communities with water for livelihoods [a]nd also incorporating environmental sustainability to it so ensuring water in the aquifer has been tested and it's going to be there regardless of the time of the year and things like that." This was further supported by Participant 27's observation,

> I guess that is one of the main objectives with which any intervention which we design happens, is to say that people should realize the importance of the resources around them… In a lot of places there is a significant realization within communities to say that, "Okay we will work towards ensuring that our resources remain safe. We will take care of them properly." But I come back to the fact that this is an extended process. This process takes time for the community to actually come on board so once they are on board, I would say yes, there is [progress].

This delineates how there is a general perception amongst meso-level participants that in their experience over time, they believe progress has been made in creating this understanding and space to care in relation to the human-environment connection, but there is also recognition that there is more work to be done.

5.4 Insights from the macro level

At the macro level, no particular water project was used to focus the inquiries of semi-structured interview questions. This was for the same reasons noted above in the meso-level interview (see section 5.3).

5.4.1 Participants' relationships to water governance

The five macro-level participants represented a very broad gambit of connections to and experience with water projects, management, and governance. Macro-level participants included researchers, policy experts and advisors, government program consultants, and NGO consultants. All macro-level participants did not just fall under one of these umbrellas of connection, but rather their experiences, both personal and professional, has taken them through a number of these roles.

5.4.2 Perceptions of the water governance landscape

The questions surrounding perceptions of the water governance landscape gave insight into the structural, functional, and normative spheres. Structurally, all participants mainly identified the political class, the bureaucracy, and civil society (NGOs and research institutions) as being the major genre of players in the water governance landscape. When asked about the key people in water governance, Participant 28 said, "The political class and the bureaucracy [and] NGOs and CSOs must play a large role," demonstrating the main areas participants identified as important to the water governance arrangement. They also highlighted that there are a huge number of departments, agencies, international organizations, and local NGOs responsible for water provisioning, management, and governance. One participant when asked about who they saw as important to the water governance landscape structure replied with this exemplary quote which highlights the myriad groups involved in water governance and implementation across India. I asked, "Throughout the water governance in India, who do you think are the key agencies, groups, institutions, or people involved?" to which Participant 18 replied:

> Ministry of Water Resources, government of India. And since water is state subject… all states have their water resources department – either it is Ministry of Drinking Water or Water Resources or the Public Health Engineering Department… Then there are institutions – World Bank in a big way gives technical as well as financial support. [Asian Development Bank] provides. WaterAid is another organization, the UK-based WaterAid. And then UNICEF is really a major player when it comes to rural water supply. For groundwater, we have the Central Groundwater Board which is another agency under the Ministry of Water Resources. So Ministry of Water Resources has CWC (that's Central Water Commission) and CGB (Central Groundwater Board). These two are agencies.
>
> And then there are regulatory authorities – Ministry of Environment and Forest and Climate Change, that also fits in. It has the Central Pollution Control Board and all the

> states also have… well most of the states have Central Pollution Control Boards which caters to the water quality issues. So water comes under 7 or 8 ministries at the central level, and then there are about 8-10 major international agencies, and then there are state organizations. There are state boards, state boards in the sense that Delhi has Delhi Jal Board, Mumbai has… So all the major metropolitan areas have their own boards. And there are local NGOs through which these projects are implemented. When they take [assistance] from the World Bank, the government implements it through NGOs. It's not just one NGO. It's a group of NGOs and some academic institutions also step in. And Maharashtra has this MWRRA [for water]…. so the military performs authority.

The participant's lengthy quote illustrates just how many hands are involved in water management & governance across India and just how diverse the approaches to it are across India as well, depending on the context and scale of different efforts.

Functionally, the macro-level participants highlighted functions like decision-making and policy-setting at the national and state level, as well as the presence of silos and fragmentation. Looking first at the decision-making and policy-setting functions, Participant 20 said, "[W]ater is a state subject and not a central subject. So now it depends on how much money the state has and what is the support from the central and center," and Participant 28 also said, "[But] there is central policy and central guidelines and central circulars, based off which the state also tries to plan something and implement some strategies again." This demonstrates the general perception amongst macro participants that decision-making and policy-setting are the major functions at the national and state bodies who are involved in governing water. Considering the other functional areas that macro-level participants highlighted, the presence of silos and fragmentation across the water governance landscape was another highly-noted functional trend. Generally, this was embodied by participants talking about the specific features like 'lack of communication, duplicities, and the bureaucracy', which all related back to the perception of silos and fragmentation in the water governance landscape. There were also many more specific references to the silos and fragmentation. Participant 20 observed, "you need support from other departments. Right now, they are working in isolation." Participant 8 also noted, "So it was… it *is* still very fragmented. Though water is connected in space, in terrestrial and sub-terrestrial, the [different] departments kind of look at it within limited spaces." The perception that major structural features of the water governance landscape are operating in silos and that there is a general presence of fragmentation is important for understanding the achievability

of SDG 6 targets as well, since many of the targets are linked in nuanced ways and require coordinated efforts and concerted action to address.

Considering the normative aspects, the macro-level participants highlighted the concurrent system as the major paradigm influencing the water governance landscape. Participant 20 highlighted this saying, "You know, water is a state subject and not a central subject. So now it depends on how much money the state has and what is the support from the central and center." Participant 18 agreed, saying, "And since water is state subject… all states have their water resources department." Participant 8 highlighted that the concurrent system is more nuanced, saying, "Water is both a state subject and a federal subject which means that as long as the water is generated or the precipitation falls within the state, the federal government does not have any say in how it is governed or managed, how it's distributed, whatever. But in most Indian rivers, they're all shared trans-boundary basins, so naturally the federal government can interfere in how the distribution occurs." The frequency with which the concurrent system was referenced within the macro-level interviews shows that the concurrent system is perceived as an important normative aspect of the water governance landscape. This was further supported by macro participants emphasizing the distinction between national level initiatives and state-led implementation. Participant 28 observed, "Though the decision-making [is] at the higher level… the implementation is with the bureaucracy," highlighting that the function of implementation is majorly held within the state sphere.

Additional mentions were made throughout macro-level participant interviews around all the other normative features identified in Chapter 4 (caste system, current policies, economic development, influences from the international community), but these were not mentioned in direct connection to questions about the water governance landscape and thus will not be explored in this sub-section.

5.4.3 Enabling and hindering factors for SDG 6 targets

Table 5.4 below details all the enabling and hindering factors identified by macro-level participants.

Macro-level participants identified 23 enabling factors, including themes like community involvement, planning, knowledge and capacities, context, and implementation. They identified 27

hindering factors including themes like change, information, intentions, policy design, and politics. There were six cross-cutting factors as well which mostly involved the interaction and relationships between different players in the water governance landscape, similarly to the cross-cutting factors at the meso-level.

Considering general observations, there is an overall trend toward highlighting the realms of policy and institutions. Taking policy, factors like 'capacity building, good monitoring, too much responsibility on PDOs, shared vision, funding, and reactive / retrospective policy-making' all relate back to policy in some way or another. This focus is further supported by a quote from Participant 8 who said, "So state governments are also working towards [better policy and practice]… We're getting there. We're still at the stage where we're discussing, debating how we go about this. The plans are not in place, the ideas are not in place of how we get the plans worked out, and implementing those ideas and plans is still in the thought process… I think those connections are the ones which need to be linked in practice." Looking toward institutions, many of the factors involve the structure and function of different institutions, including factors like 'high turnover rate in bureaucratic positions, access to information, transparency, and accountability.' This is further support by Participant 8 who continued, "But the governance systems, the governance structures, the departments, the agencies, the state does not recognize that this somewhere needs to be integrated in a larger way that it exists in nature," while discussing the lack of incorporation of ecological markers in the water governance arrangement. This enumerates the importance of the way institutional arrangements are designed.

Interestingly, many of the macro-level factors also invoked the realm of context-specificity. This seems slightly counter-intuitive to some extent because one might assume that macro-level participants carry a high-level view, but to work in and understand the larger picture is also to understand the faults of working at such a high-scale. These macro-level participants understand and wanted to communicate the need to create space for context-specific considerations and the way context may impact each of the factors identified above.

Table 5.4 – Enabling and Hindering Factors: Macro-level

Macro-level Perceptions of Water Governance & Management		
Enabling Factors	**Both**	**Hindering Factors**
• Accountability • Capacity building • Community participation • Context-specific solutions • Coordinated approach amongst the different managing departments (systems approach) • Coordination / Teamwork • Decentralized approach • Education • Flexibility • Good monitoring • International pressure (political leveraging and funding) • Involvement of community (in general) • Involvement of community in decision-making • Knowledge-responsive / science-driven policy • Leadership / Facilitation • Problem recognition and understanding • Quality individuals (good intentions and capacities) • Sharing of power / authority / oversight • Training • Transparency • Using 'good' NGOs • Vision (Shared) • Water planning with communities (safety and security)	• Communication between departments • Concurrent system (federal and state jurisdictions) • Ensuring equity • Relationships / trust • Education / awareness levels • Funding (continuity, sustainability, mobilization, accountability)	• Access to information • Blanket policies • Bureaucracy (slow & volatile) • Caste system / class differences • Changing foci (political cycles, agendas, doing what's sexy) • Development changes (urbanization, peri-urban areas, etc) • Dramatization of problems (media, politics, responsiveness to it) • Firefighting (urgent day-to-day issues) • Funding (continuity, sustainability, mobilization, accountability) • Gap between (policy) intention and reality • High turnover rate in bureaucratic positions • Implementation in reality • Indicators • Individuals – corruption • Individuals – poor capacities • Influence of businesses (economic motivations) • Lack of community participation (poverty, space to care) • Lack of oversight • Political cycles & agendas • Poverty / literacy • Reactive or retrospective policies / decision-making • Red tape • Scaling of projects • Source dependency (on groundwater) • Tariffing of water (willingness to pay) • Time (criticality of present needs, criticality of quick action) • Too much responsibility on PDOs (panchayat development officers)

5.4.4 Human-environment connection (SES) in water governance

Looking at the question of human-environment connection, there is a general observation that many current disconnects between humans and environment gave their origins in a general shifting of economy and values in India that has happened over the last five decades since the Green Revolution. Participant 7 made a poignant observation reflecting, "In India we have a culture of people connecting with water… But after certain development processes, the disconnect [between humans and water] has started to appear. And especially after globalization and urbanization, it's more of a monetary economy, a capitalist economy, which is coming up where people are kind of ignoring these earlier connects and going towards the monetary aspects which are [perceived as] more important." This illustrates the way changing socio-economic dynamics has impacted the understanding of human-environment connection in India.

When asked directly about if macro-level participants thought the human-environment connection through water resources was reflected in the water governance landscape, there was a general consensus that academic institutions and research does reflect the value. Participant 8 supported this stating, "The integration [of social-ecological systems] is happening only at a conceptual level amongst the researchers' heads." This highlights that it has not translated into policy, practice, institutional arrangements and functions, or on the ground. Participant 8 continues, "I mean, it's there in our heads and we try to like describe those connections to [the government]… At least the thoughts are playing out both from the government side that we should be looking at ecosystems, but I'm not sure whether they are looking at it purely from an ecosystem point of view which is non-human use." This reflects the meso-level assertion that the water governance landscape is undergoing transformation, but it seems that macro-level participants are less convinced than meso-level participants that the trajectory of improvement will be sufficient to achieve SDG 6.

5.5 Discussion

5.5.1 Comparing Micro-level perspectives

Each case study has been presented separately above in order to highlight the importance of context at the micro-level. It is also important to explicitly explore the similarities and differences

between these two case study contexts in order to understand and differentiate between shared and context-specific perceptions.

There are three major similarities between the case studies: perceptions of a structurally hierarchal water governance system, recognition of the importance of interactions between different individuals or entities, and a thematic focus on knowledge and capacities. Both case study sites shared a perception of the governance of water in their community as linked to a hierarchical system. This is important especially because of the perceived rigidness, bureaucratic obstacles, and power dynamics in the system, as well as the lack of formal integration of the community into the water governance system. Within the hierarchy, there was also a shared recognition that there are many players in water governance, including individuals and departments. Participants from both case study sites noted in their enabling and hindering factors the role of communication, cooperation, and/or coordination amongst those actors as essential to successful water projects. Finally, there was a shared focus on the thematic area of knowledge and capacities, which were noted across semi-structured interviews as important.

While there are clear contextual differences between the two case studies, there are also many other differences that are recognizable from semi-structured interview responses, namely the level of connection to the respective water projects, perceptions of enabling and hindering factors, consideration of NGOs, and involvement of community members. Looking first at differences in connection to the respective water projects, this is notable as a difference that arose specifically because of the differences between the NRDWP and the NDWSPP, as the NDWSPP explicitly sought to incorporate community members in the processes while the NRDWP did not in practice. This is important because it both informs and impacts the perceptions of enabling and hindering factors. These perceptions then understandably differed between case studies, most noticeably in the sheer number of responses in the hindering factors column. It is interesting to note that in connection to this numerical phenomenon, the substantive content of the enabling and hindering factors is very similar, but participants in Mulbagal tended to express them as enabling factors, while Thirumagondanahalli participants noted them in negative language and thus, were considered hindering factors. This is exemplified taking the Mulbagal enabling factor of ‘proper operations and maintenance’ and comparing it to the response from Thirumagondanahalli ‘operations and maintenance lies outside community capacities.’ The sentiment of the importance of community to fulfill their own operations

and maintenance is consistent, but in Mulbagal, participants had been empowered to learn, building capacities, and take ownership over this, while those same opportunities had not been afforded to people in Thirumagondanahalli. This connects to the differences in the consideration of NGOs, where Mulbagal participants explicitly highlighted the importance in the NGO implementation of the NDWSPP, while Thirumagondanahalli participants made almost no reference to NGO involvement in water governance, management, or provisioning. This also connects to differences in the level of direct community involvement as the NDWSPP in Mulbagal brought a lot of opportunities for involvement, where the NRDWP in Thirumagondanahalli did not. This relates to the overall differences in levels of exposure to NGOs during water projects. It also affected community perceptions of involvement in water governance processes, demonstrated as people in Mulbagal were directly and formally involved while citizens of Thirumagondanahalli only felt indirectly connected through voice, voting, and financial contributions.

Other important differences include divergent perceptions of the water governance landscape's ability to change. Looking first at the ability of the water governance landscape to change, Mulbagal participants noted enabling factors like the incorporation of water conservation in policies and programs, as well as the use of context specific solutions and involvement of communities in decision-making processes. Each of these factors shows a belief that the water governance system has room to change, whereas in Thirumagondanahalli, there was only expression of discontent with some of the prevailing paradigms in the like 'slow bureaucratic processes and unresponsive institutions'. This is interesting to note as Thirumagondanahalli residents expressed an overall disempowerment from being able to change the system while Mulbagal residents viewed the policies and schemes as more fluid and expressed excitement over their community pushing for change toward those enabling factors. Mulbagal residents shared very similar frustrations with the water governance landscape as the Thirumagondanahalli residents, but felt more of an internal locus of control over the situations in their community than Thirumagondanahalli residents expressed.

The final notable difference is the recognition and understanding of human-environment connections in relation to water resources. Where in Thirumagondanahalli, participants had difficulty understanding the question about human-environment connection, people in Mulbagal spoke about human-environment connections before the question came up in interviews. This difference is important especially because of the way SDG 6 targets aim to address and overcome problems that

arise because of the human-environment connection. Thus, having explicit recognition of the complex ways in which human and environmental systems can both positively and negatively impact each other is important to the achievement of SDG 6.

The differences explored above have a deep connection to the differences in the schemes or water project that each community received, as well as their implementation. Based off the information presented so far, it may seem as though the NDWSPP was just a superior scheme. While the pilot project did include some important pieces that the NRDWP does not like water budgeting and security, it is interesting to note that the NRDWP implementation guide highlights the importance of education, community involvement, context-specific solutions, and human-environment connections (Department of Drinking Water Supply 2010). There was an obvious discrepancy though between the content of the NRDWP implementation guide and the way it was implemented in Thirumagondanahalli, signaling the need for further reflection on the importance of implementation of water projects in communities and perhaps also the value of NGOs as intermediaries.

5.5.2 Multi-level Synergies: All Participant Groups

Table 5.5 below compiles the enabling and hindering factors that were shared across all participant groups.

There are a few notable similarities across all participant groups' responses during semi-structured interviews, particularly in relation to communities, water governance actors, political processes, planning, and implementation. Looking at communities, shared factors like capacity building, education, and involvement in communities are perceived as important. The importance of the interactions amongst actors in the water governance landscape and across scales is also of note, especially as this looks different at each scale. The perception of political and bureaucratic processes as roadblocks in the governance of water is an interesting similarity across scales as well since government is generally considered responsible for water in India. Planning is an interesting theme that is shared across the participant groups as well in its relation to adaptive capacity, planning for future generations, and overall considerations of sustainability. Finally, there are also shared perceptions of the importance in good implementation, especially in relation to the disconnects between intention and reality that were recognized by all participant groups where intention generally refers to the policy and reality infers to implementation.

Table 5.5 – Synergies in Perspectives on Enabling and Hindering Factors

All Participant Groups – Synergies in Perspectives		
Enabling Factors	**Both**	**Hindering Factors**
• Accountability (of people, organizations, and institutions) • Capacity-building initiatives • Community involvement in decision-making • Community participation • Considering future generations / future situations • Context-specific solutions • Education • NGO involvement • Pressure (bottom up from communities; top-down from international community) • Problem recognition and understanding • Quality individuals (good intentions and capacities) • Sufficient funding • Teamwork • Training • Vision (Shared)	• Funding (continuity, clarity, sustainability, mobilization, accountability)	• Access to information • Climate change • "Implementation in reality" • Natural variability • Political agendas (individuals & parties) • Political cycles • Red tape • Room for corruption • Slow bureaucratic processes • Slow response of institutions • Time

These similarities are also interesting because while the general summation of the factors is shared, they can mean different things at the different micro, meso, and macro levels. Taking the example of the factor 'accountability,' it is specifically noted in the chart that accountability invokes different realms – people, organizations, and institutions – depending on the scale the participant is associated with. For instance, the micro-level participants identified people being held responsible, like the community members and the politicians. At the macro-level, they identified the need for institutional accountability. At the meso-level, participants identified the need for people or communities, organizations, and institutions to all have accountability and supported that accountability looks different at different levels. These differences in what 'accountability' may mean or who it may involve supports that there can still be differences within these similar factors depending on context. This further supports the importance of both scale and context when considering and analyzing the suite(s) of enabling and hindering factors.

5.5.3 Trends & Implications

There are major trends to note across the semi-structured interviews. First, while there are many similarities between the perceptions across all participant groups (see Table 5.5), there are distinct differences between the scales as well. For example, at the micro-level Table 5.1 shows 'land-use planning' as an enabling factor in Thirumagondanahalli, but this is not highlighted at the meso or macro scales. It is a factor unique to scale. This means that scale or context plays an important role in determining what the enabling and hindering factors are and therefore, what is relevant. Second, the enabling and hindering factors affirm many of the recommendations coming from the water governance literature discussed in Chapter 2, for instance calls for collaboration (Pahl-Wostl 2015) and the need for adaptive capacity (Pahl-Wostl 2007). Considering collaboration, factors like community participation, teamwork, and shared vision all highlight the need for collaboration. Looking at adaptive capacity, this recommendation from the literature is affirmed by factors like considering future generations / future situations, slow response of institutions, and context-specific solutions. Third, the perspectives from semi-structured interviews affirmed the relevance of the four criteria identified in the conceptual framework – transparency, accountability, participatory, salience. Looking at transparency, the value of transparency as a criterion is upheld through the enabling factors of funding and community involvement in decision-making, as well as the hindering factors of access to information, political agendas, and room for corruption. Accountability is similarly upheld as a criterion through the enabling factors of accountability and pressure. The relevance of salience is additionally affirmed through the enabling factor of sufficient funding and the hindering factors of red tape, slow bureaucratic processes, and slow response of institutions. Participation has already been explored and affirmed in this paragraph in relation to recommendations from the literature. This is important because it means that these criteria are important to some extent for determining and enhancing SDG 6 achievability. Fourth and finally, while the four criteria in the CF are relevant, there are other enabling and hindering factors which do not connect to those ideas, for example education, implementation in reality, climate change, and time. As such, the four proposed criteria for assessing and enhancing SDG 6 achievability are not comprehensive.

These four major trends have two important implications for the conceptual framework presented in Chapter 2. The trend of some factors being unique to a particular participant group suggests that scale and differences between scales may be important determinants to be mindful of within the conceptual framework. Additionally, the four criteria proposed in Chapter 2 to assess and

enhance SDG 6 achievability were affirmed, but they were not comprehensive. It will be important to reconsider what criteria may be more inclusive, needed, and useful within the conceptual framework for enhancing SDG 6 achievability. The two implications therefore infer a need for the conceptual framework to be revisited and modified.

Overall, this chapter examined three levels of perspectives on water governance in India, including two micro-level case studies. There are numerous similarities, differences, and synergies in the perspectives presented above, with some preliminary direction for how to enhance SDG 6 achievability in India. The conclusions from this chapter do point to a need for further reflection considering other ways SDG 6 achievability may be enhanced and criteria through which the conceptual framework may be strengthened. Insights for how to enhance the achievability of SDG 6 will be further enriched through analysis in Chapter 6. Over the next chapter, this will be done especially in relation to the suite of enabling and hindering factors presented in this chapter through identifying conceptual, thematic, and practical trends. Accompanying reflections on implications for the conceptual framework are discussed in Chapter 7.

CHAPTER 6

Conceptualizing Water Governance: Complex challenges and pragmatic strategies to enhance SDG 6 achievability

Table 1.1 – Research Objectives

Objective 1	To explore and analyze the existing water governance mechanisms (institutions, instruments, treaties etc.) that can either facilitate or impede water governance at multiple levels with attention to the SDG 6 on water
Objective 2	To capture multi-level experiences around success and failure in water governance for SDG 6 targets, especially key factors contributing to and/or hindering SDG 6 achievement
Objective 3	**To synthesize insights and suggest ways in which existing governance mechanisms can be further strengthened on multiple scales in relation to SDG 6**

As demonstrated in Chapter 5, the unique perspectives and collective experiences across micro, meso, and macro scales give context to the complexity of the water governance landscape in India. While literature around water governance highlights the strong presence of complexity (Pahl-Wostl 2015; de Loë and Patterson 2017; Woodhouse and Muller 2017), there is often a perception that these complexities are inherently troublesome and need to be overcome through reducing them. Taking inspiration from Donella Meadows' *Thinking in Systems* (2008, 110), she writes, "Being less surprised by complex systems is mainly a matter of learning to expect, appreciate, and use the world's complexity." As Meadows (2008) so aptly observes, our world is inherently complex, so instead of trying to make systems more simple, we should learn to understand complex systems in order to use that understanding to our advantage, especially as we plan for the future and move into practice (de Loë and Patterson 2017). Overall, we can use the individual and collective perspectives presented in the previous chapter to derive a more systematic knowledge to this end.

The focus of this chapter is to explore and unpack the conceptual learnings, themes, and processes that can be derived from the information presented in Chapters 4 and 5. Synthesizing

learnings from these two chapters contributes directly to Objective 3. This chapter presents this synthesis in three parts. First, a section on themes arising from the enabling and hindering factors, particularly detailing five important thematic areas is explored. Second, the utility of recognizing and thinking through water challenges in particular will be discussed, including discussion around different types of challenges to water sustainability. Third, a discussion section relating the implications for enhancing SDG 6 achievability concludes the chapter.

6.1 Themes in Enabling and Hindering Factors

Chapter 5 provided a summary of the enabling and hindering factors identified during semi-structured interviews, as well as a discussion comparing trends in the different micro, meso, and macro participant groups. It is also important to detail and examine the themes that are seen in both the enabling and hindering factors. This is important because information on themes that encompass both the enabling and hindering factors can provide direction for how to enhance SDG 6 achievability which supports the aim of Objective 3. It will also provide insights that may strengthen the conceptual framework.

As described in Chapter 3, five major themes were identified from the semi-structured interview data on enabling and hindering factors in water governance for SDG 6: practical considerations, power relations, knowledge & capacity building, policy design, and institutional design. These were derived from iteratively grouping the individual enabling and hindering factors based off similarities in their sphere of concern. In order to visualize how these thematic areas relate to the individual enabling and hindering factors described in Chapter 5, Table 6.1 uses the factors that were shared amongst all the participant groups (micro, meso, macro) organized into their corresponding coded themes.

Table 6.1 - Shared Responses of Enabling and Hindering Factors with Themes

All Levels – Micro, Meso, Macro		
Enabling Factors	**Hindering Factors**	**Thematic Areas**
Teamwork	Nature & Climate Change	**Practical Considerations**
	Time (criticality of present needs) Rep Tape – Slow Bureaucratic Processes	
	"Implementation in reality"	
Pressure (internal from citizens; external from international community)	Political Cycles & Agendas	**Power Relations**
Capacity building initiatives		**Knowledge & Capacity Building**
Problem recognition and understanding		
Training		
Education		
Quality Individuals (intentions & capacities)		
Considering future generations / situations		**Policy Design**
Accountability (of citizens, politicians, bureaucrats)		
Community Participation		
Vision		
Sufficient Funding		
Problem recognition and understanding		
Funding (continuity, clarity, sustainability, mobilization, accountability)		**Institutional Design**
Monetary Support		
Accountability		
NGO Involvement		
Community Involvement in decision-making		

6.1.1 Practical Considerations

Looking first at 'practical considerations,' this theme really encompassed those enabling and hindering factors relating to the realities (circumstances) of implementation of water projects. This often involved very practical elements like finite resources or difficulties of coordination, but also include some of the factors like climate change which are larger circumstances or considerations

outside the realm of being directly actionable. Using Table 6.1 for examples, these more practical enabling and hindering factors can be seen in responses like 'teamwork' which plays an important role in being able to implement a project because it can impact, positively or negatively, all of the practical steps during a project. Considering the other kinds of trends that influence implementation, but are not necessarily actionable, in the Table 6.1 examples participants identified 'climate change', a force which increases uncertainty around climatic patterns, as a hindering factor for successful implementation during water projects. Climate change is a force which impacts the success of implementation on the ground, because even if a project is installed successfully, the uncertainty and variability of climatic patterns which have been historically dependable means projects designed around dependable climatic patterns may no longer work practically in reality. From the participant in Interview 10, they reflect on the effects of changes in rainfall, saying, "When we started this program, there was normal rainfall. But what we experienced during the project period was less rainfall than the normal so that was one thing we had to consider and said, okay, even if [rainfall is] less, we'll still go ahead with the program…" Another example of a factor from the 'practical considerations' theme is the identification of 'time' as a hindering factor in successful implementation. Implementation of water projects undoubtedly takes time, as does the organizational aspects of preparation for a project and the post-project monitoring and adjustments. In Interview 10 speaking on the amount of time for a government project to be implemented, the participant noted:

> They had the tiny amount of 2 years. Within two years, what is the impact that we can make? … [T]here was slow progress of project because, you know, you have to understand the community and we had to get some data then we had to process that. We had to meet people, then you have to decide okay, which are the key people – to locate them, to interact with them, to increase the awareness level to some level you know so you can go to the next level of assessment. All these things took time.

This highlighted the time-intensive nature of water projects as they are implemented on the ground. While this is often necessary for the longer-term success of projects, 'time' is considered a hindering factor against the criticality of present needs as well. Illustrating this point, in Interview 28, the participant said, "[N]aturally, the agenda is different at each level [but] for a community, for a panchayat, it's a basic need of the hour. They don't have so much time to think beyond." When the need is critical, there may not be space for impacted stakeholders to care about the longer time horizons involved in some water projects, further exemplifying the ways in which time can hinder

'success' of implementation around SDG 6 targets. These examples illustrate how the practical considerations theme category encompasses those factors which relate to the practical aspects (i.e. time) or seemingly inescapable 'realities' (i.e. climate change) of implementing water projects around SDG 6 targets.

Relating back to earlier discussion in Chapter 2, the thematic area of 'practical considerations' and 'water management' are connected to one another. It can be understood that much of the 'practical considerations' factors relate directly to enabling and hindering factors that involve water management. To reiterate, water management is defined as "the application of structural and non-structural measures to control natural and man-made water resources systems for beneficial human and environmental purposes" (Grigg 1996) so water management is literally responsible for implementing the practical considerations to achieve the goals identified by water governance processes. The most potent example of this is the hindering factor "implementation in reality" where the concerns of the day-to-day hardships faced on the ground are highlighted. This highlights the connection to the on-the-ground management of water very explicitly. This does not mean however that the 'practical considerations' factors don't involve water governance. The hindering factor 'climate change' for instance is a concern for both water governance and management – for water management as it relates to challenges faced on the ground like insufficient water quantity and for water governance with the hindrances it poses through uncertainty which makes planning more difficult.

6.1.2 Power Relations

Many of the enabling and hindering factors explored in semi-structured interviews related to relationships between individuals or groups of people, often in the sharing between or exercising of power over these different individuals and groups. These factors were coded under the theme 'power relations' as a summary of these relational factors which often involved some perception of power dynamics at play. In Table 6.1, an enabling factor example of this was the use of 'pressure,' both from citizens as well as the international community, to encourage action. In the local manifestations of citizens using pressure, this related to using their voices to show political leaders their desires or displeasures, therefore encouraging action from political leaders. This pressure on political leaders from the citizenry is only possible because of the power relations at play as the political leaders derive their power or status from the votes of the citizens. At the international level, there are many different kinds of pressures that are used to encourage an entity toward certain actions, including but not

limited to funding incentives and consequences, as well as places at the table within different organizations. On the financial side, Participant 7 notes:

> We do definitely have national targets, but… I think the international pressure also works on the government… because the importance of these issues are highlighted at the international level. And then you have your various [international] development organizations. Because you have your World Bank / United Nations programs… World Bank has been working on water supply, rural water supply and sanitation in many states of the country – Uttarakhand, Uttar Pradesh, Maharashtra, Kerala, Karnataka – and these states have performed better compared to other states.

These examples enumerate the use of financial capital and capacity services by international entities as means to direct states within India toward certain projects and outcomes on water-related projects. Participant 8 eloquently summarized other 'power relations' concerns from international pressures, saying:

> A lot of it is also international politics and the geo politics. If India has to play a role as a major political player in the global forum, the UN or the World Bank or [indecipherable] nation states, some of these things do matter because that elevates them to a negotiating platform they've never had before so it's essential for them to take certain global initiatives [like the SDGs], implement… And then of course there are global trade embargos that could be basis of a certain international alliance.

Both examples illustrate well how the enabling factor 'international pressure' is really connected back to the power relations dynamics at play.

Considering hindering factors, the example of 'political cycles / agendas' is identified because of the ways in which personal or party agendas negatively impact water initiatives as some groups may prioritize water while others do not within a political system with high turnover rates. While the agenda around achieving water goals is not contentious, the volatility of changing approaches, perspectives, and priorities in the political realm is deeply tied to personal power, as well as allegiance to the party which has facilitated personal positions of power. Illustrating this is a potent quote from Participant 28 where the participant says:

> Whatever system you have in place… unless the person at the helm of a place sees the connect or drives it, then the next person who replaces him might change the whole agenda itself. And

> same with the political class. They would have had some election manifesto earlier drafted and some areas of their own interest which they want to drive. So they might bring that to floor and then, have it be water or sanitation like Modhi's agenda… And it's always that the center and the states are always mismatched because of different parties, political parties it could be or their different backgrounds or manifesto. So there's a mismatched most of the time.

This suggests ways in which the hindering factor of 'political cycles / agendas' is demonstrative of the 'power relations' theme. Overall, the nature of the concentrations of and changes in power at play between the actors and stakeholders in the water governance landscape is made apparent, having obvious implications for pathways to achieving SDG 6 targets.

6.1.3 Knowledge & Capacity Building

There were numerous enabling and hindering factors that invoked the realms of education, information, and skills, summarized into the thematic area 'knowledge and capacity building'. The presence of education, information sharing, and bolstering of skills through education and information was seen as an enabling factor in water initiatives, while the lack thereof was seen as a hindering factor. The enabling factors in Table 6.1 were the 'need for capacity building initiatives', 'training', 'education', and overall 'knowledgeable, capable individuals working on water issues'. Examples in Table 6.1 only show enabling factors under the knowledge & capacity building thematic area, but hindering factors also come out when only taking factors from one scale of participant group. These enabling factors highlight the dimensions of knowledge & capacity building on individual and collective scales for successful water projects. Additionally, the enabling factor 'problem recognition and understanding' presents another side to theme category, that there needs to be the ability to capture or create knowledge around the issues being faced, as well as the ability to understand that knowledge. With hindering factors, Participant 20 identified the poor capacities of individuals (specifically to understand and deal with water quality problems) as detrimental to accomplishing water goals, saying, "In fact, most of the engineers aren't aware about the water quality. They say [that if the water is clear], it's clean. But they don't realize that water can be clear but be contaminated with bacteria…. These are places which need more capacity." 'Poor capacities of individuals' can then be understood and coded as a hindering factor in connection to the larger knowledge & capacity building theme. Whether on an individual or collective level, the role of these

factors surrounding knowledge & capacity building is clear in water initiatives and prevalent across the different enabling and hindering factors identified by interview participants.

6.1.4 Policy Design

Policy Design is another theme identified around the enabling and hindering factors. Across the micro, meso, and macro scales, participants agreed that there are certain components that help and hinder the achievement of water targets from a policy perspective. Because policy design is both a process and an outcome, these can all be seen as factors that can be incorporated specifically into the policies themselves (substantive content of policies) and/or the processes through which the policies are designed. Community participation in policy design and the participation of communities in the implementation of policies are potent examples of these two pieces to the policy design theme. Using these enabling factors as examples, Participant 10 noted the importance of involving community members in the process of designing plans and policies, saying:

> [The community] gave us the institutional scenario and there were so many discussions… For toilet example I can tell you, 1 person said, "Okay. You are telling us to construct a toilet. Fine. My land is 2-3 kms apart from my home. I'll be working there. Suddenly if a nature's call comes, I can't come to the toilet running 2 or 3 kms." That made us think. That made us think about the different scenarios… So all these things, they have written… That's very important… They told us where the gaps are.

This shows the value of involving communities in the policy-making process especially for the long-term success of a project, specifically in this instance for identifying potential problems in the original policy design. Participant 27 made similar observations in their interview, noting:

> The core idea behind what we do here is to say that we want to empower the communities to be able to make their own water security plans. They understand their resources best because they are the ones that have to use it, and if these plans are made in a very centralized manner by authorities then they don't go and achieve what they should achieve.

This further solidifies that importance of process-oriented involvement of community in policy design. On the substantive content side of policies, many participants communicated the importance that community member participation be a focus of the policy. Exemplary of this was the thoughts of Participant 7 when they reflected on the rise of participatory approaches in policy and practice, calling participation one of the pillars of the water governance arrangement in India. This shows the value and prevalence of specifically including the involvement of communities during implementation in the substantive content of the policies themselves.

6.1.5 Institutional Design

The 'Institutional Design' theme centers around those enabling and hindering factors that relate to the ways in which the structural, functional, and / or normative aspects of the water governance landscape are set up. As an example of this, Participant 25 identified the process around 'access to information' as a hindering factor, saying, "[S]ometimes we get letters from MLA [about information or data for water initiatives]. By the time we get the information, it will be almost a month, meanwhile the process will already be started." This obviously presents a challenge when information critical to a project is hard to obtain, either delaying the project or in the instance that Participant 25 describes, action may be taken without the information because the present human needs around water are dire. This is an institutional problem because the bureaucratic (functional) and hierarchical (structural) design of the Panchayat Raj institution makes things like communication across departments and access to information incredibly difficult, labored, and slow. The institutional design additionally lacks structural and functional mechanisms or databases to address these issues around communication and information, therefore it can be understood as an issue of institutional design. Another example of this is the lack of a structural oversight mechanism or functional role for oversight in the broader water governance landscape of India which was identified as a hindering factor by macro-level Participants 8, 20, and 28. Because they lack is in the structural and functional areas, this relates back to the institutional design category.

6.2 Conceptualizing Water Governance Challenges

The preceding considerations presented in Chapters 2-6 for the improvement of water management and governance in India highlight numerous determinants of success, such as best practices, approaches, and the continuation of good governance. During my field work though, I saw numerous well-designed, well-implemented water initiatives that aligned with many of the ideas expressed above that ultimately resulted in failure. For example, the case study initiative in Mulbagal used a well-facilitated, well-designed approach to address water security, drinking water, and sanitation that targeted capacity building and knowledge, policy design, and institutional design. During my site visit to Mulbagal, I noticed some of the infrastructure built by the project was no longer functional and the project representatives were surprised to see this as well. They inquired with the local community facilitators and it was revealed that changes in climatic precipitation patterns had rendered the infrastructure useless. This was not an isolated observation, and throughout my time in

India, I saw countless other water projects that had fallen into various stages of disrepair. The old adage, “There are a million ways to fail and one way to succeed,” came to mind.

While there is certainly more than one way to succeed, the pervasiveness of observable failures made me think. It made me reflect specifically on the importance of being prepared to overcome the numerous challenges that will be faced while trying to achieve SDG 6.1 and 6.2. Some of the water governance literature also highlights the importance of using experiences around challenge and failure in order to have a more complete perspective on what will enable long-term success in water initiatives (Biswas and Tortajada 2010). When looking specifically at the challenges that were explored and enumerated in semi-structured interviews, it became clearer that challenges could be categorized and a more systematic approach to overcoming the challenges could be derived. As such, I revisited the hindering factors specifically, grouping them into types of challenges to SDG 6 achievability.

First, it became apparent that challenges ranged from concrete to abstract in nature. In some interviews, participants would note very concrete or technocratic challenges, such as a lack of infrastructure or proper equipment. This is a specific challenge that manifests from a lack of a physical resources and any resulting hardship. As a more specific example of a concrete challenge, ‘electricity-dependent access to water’ was identified as a challenge at the micro level by some participants. Because electricity is only run intermittently – every other day for 2-3 hours in the case of Thirumagondanahalli – that means water from the bore well tap is unavailable outside those hours. This is an example of a concrete challenge because it is connected to the literal lack of electricity as a resource. Concrete challenges also tend to have easily identifiable solutions, like building more infrastructure, acquiring the proper equipment, or leaving the electricity on longer. Of course, these all have financial implications that may not be realistic, but the solutions themselves are clear. While many challenges fit this description, there are also other challenges that are more abstract or intangible which do not invoke the same clarity for solutions like ‘coordination between departments’ and ‘accountability’. These abstract challenges do not have the same kind of physical or technocratic manifestation that concrete challenges do, and they do not have clear solutions in the same way that a concrete challenge does often because the source(s) of the challenge is unclear. Another example of this can be seen in the hindering factor ‘corruption’ which is an intangible challenge deriving both from individuals’ choices to abuse a system and the system itself not preventing abuse thoroughly

enough. This is commonly cited as a problem in developing nations, but there are no obvious source(s) or solutions when it comes to corruption.

It also became clear that challenges encompassed a range of scales that did not necessarily correspond with the micro, meso, and macro scales used to classify semi-structured interviews (see Chapter 5, section 5.1). While there were tendencies to talk about more concrete (micro), more abstract (macro), or a mixture of both kinds of challenges (meso) with the participant groups, this did not hold true for every hindering factor. Taking an example from the macro-level interviews, while many of their identified challenges were abstract in nature, they also identified 'source dependency on groundwater' and 'literacy rates' as challenges. Participant 20 said, "I'll tell you one thing – we have two things in our country. Most of the water is again groundwater and the groundwater is a problem… we should not be entirely dependent on groundwater sources. We should depend on groundwater and surface water both," noting the hindering factor of 'source dependence'. This can be considered a more concrete problem because the challenge involves a physical resource. In Interview 7, the participant said, "I feel that the education levels, the literacy levels, matter because [in] the places that have higher literacy there's better participation," noting literacy as the concrete manifestations of a challenge to participation. Literacy can be considered concrete because it involves individual capacities on the ground. Both these quotes about groundwater and literacy respectively are direct examples of the concrete specificity that also came out in the macro-level perspectives and highlights their ability to identify concrete, ground-level problems.

Considering the micro scale, participants identified many concrete challenges around access to materials or source dependence, but they also identified 'political cycles' and a 'lack of clarity in funding mechanisms' as challenges impeding their ability to achieve outcomes related to SDG 6 targets in their own communities. Participant 22 spoke about the more abstract challenge of 'political cycles' during water projects, saying that "If the decision [for a water initiative] is taken at the local level, the people will not listen… At local level, the opposite party will oppose." This shows how political cycles can present challenges to progress on water locally. Participant 14 illustrated the more abstract challenges that a lack of clarity in funding mechanisms creates, citing their frustration saying, "At the Zilla panchayat level, we never come to know to whom they've given money or what has happened," illustrating how a lack of clarity in funding mechanisms can have implications for accountability and corruption. These are direct examples of the ways in which micro-level

perspectives also identified more abstract enabling and hindering factors for water initiatives. With these specific examples from the micro and macro levels in mind, it is clear that the challenges being faced exist on a spectrum of concrete to abstract that is not necessarily bound by a 'micro, meso, macro' or geographic scale.

While it does not necessarily correspond with the geographic scale, it does generally correspond with a scale of management to governance. As water management has been defined more or less to encompass implementation and practical considerations (see Chapter 2), management actions tend to deal with the more concrete challenges. Water governance has been defined to encompass and thus can be, water governance tends to deal with the more abstract challenges. The connections between different types of challenges and a water management to governance scale should therefore be considered to inform appropriate responses to challenges. There are not necessarily definitive lines between 'concrete and abstract challenges' or 'management and governance actions' though, and should therefore be understood to exist on a fluid spectrum.

Figure 6.1 outlines the six different kinds of challenges spanning the range of management to governance realms, namely: Supply, source, socio-cultural, institutional, conceptual, and systems challenges. Each type of challenge is further examined below.

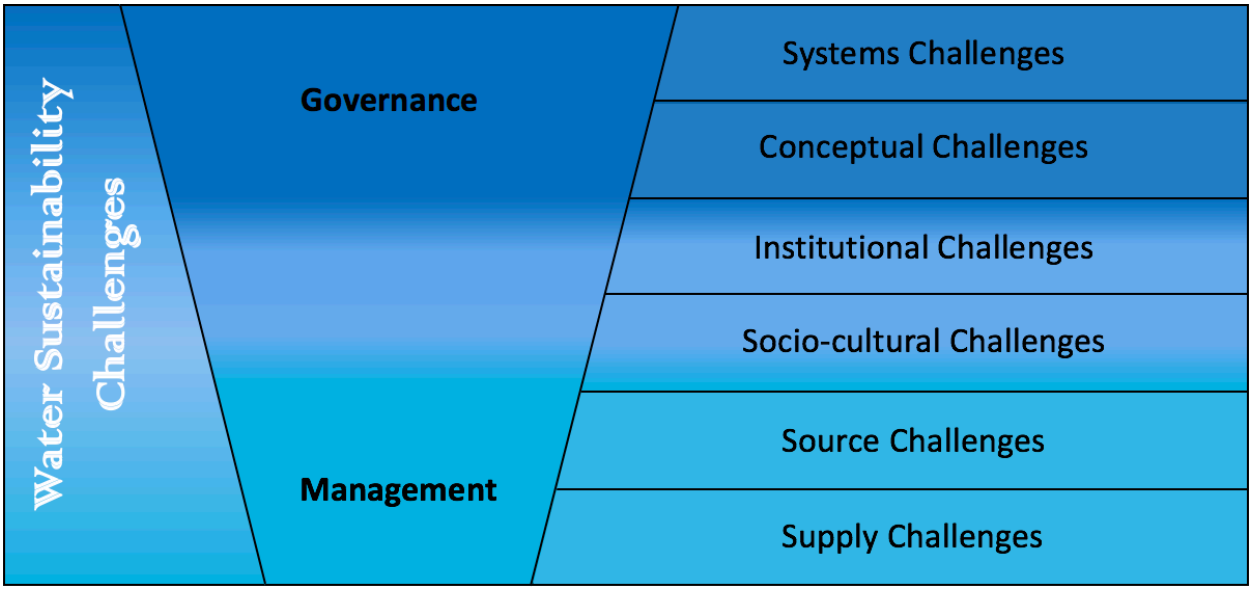


Figure 6.1 – Conceptualization of Water Sustainability Challenges for SDG 6

6.2.1 Types of Challenges

Moving from the bottom of the figure to the top, **supply challenges** are those challenges which deal specifically with distribution of water. These can be understood as mainly issues where in the physical routes for the supply of water is impacted or perhaps non-existent due to issues around things like infrastructure and equipment. It should be noted that supply challenges do not inherently require large infrastructure actions like household-piping systems or dams to be built, but rather just symbolize that there is indeed a challenge around people accessing the available water and other distributional issues.

Source challenges are those which invoke the quantity or quality of water that is available. These can be understood as challenges around the physical availability or quantity of water, as well as challenges around the physical qualities of the water including contaminants. Within this category, it should be noted that quantity of water may be impacted by larger climatic shifts taking place, but localized management actions cannot necessarily address that driver in particular, so examples of actions like alternative sources or increased efficiency are within the management scope.

Socio-cultural challenges are those which involve the social or cultural dimensions. These can be understood as relational, cultural, water-impacting, or knowledge-based challenges. Socio-cultural challenges may include for example power relations to some extent amongst social actors, but can also include challenges like education, livelihoods, cultural practices, and behavior. These socio-cultural challenges will tend to involve actions focused on interventions at the human-level, like in education, sensitization, or capacity building initiatives. Broadly, they include social and cultural traits that can potentially promote or hinder good water governance.

Institutional challenges are those which involve the organizational entities in the water governance landscape, specifically their structures and functions. These can be understood as more abstract challenges having to do with specific structural and / or functional aspects of the system. For example, the lack of communication between departments or entities within the water governance system is recognized as a challenge by all levels of participants. This lack of communication persists across the water governance system, not just in isolated incidents, and therefore could be considered an institutional challenge. These types of challenges are ones which are likely apparent, but may be

hard to address simply due to the large scale and likely require actions that seek to change the institutional arrangement or water governance landscape explicitly.

Considering **conceptual challenges**, these can be understood as those challenges in which differences in understanding of or a lack of clarity on a concept poses problems for the desired water outcomes. The term 'water governance' itself can be an example of this kind of challenge. As explored in Chapter 2, the term water governance was created and employed first in a very practical realm with the GWP (Conca 2005). This has led to confusion on exactly what is meant by water governance, and therefore different perceptions of what it means when talking about water governance. When different people working on the same issue do not share an understanding of what is being addressed, conflict can arise. There are numerous concepts like water governance which can be categorized under this kind of challenge for similar reasons. Conceptual challenges therefore may also be understood as 'challenges to shared vision or understanding' as it involves conflict that arises from different perceptions of concepts or goals. This in particular may be relevant to the discussion around SDG 6 achievement as what SDG 6 accomplishment looks like may be perceived or understood differently by different actors and requires critical engagement and elements of co-creation or understanding.

Systems challenges are those challenges which relate to the complexities that arise from the interactions of components and pressures in systems. These can be understood as problems that do not exist in isolation, but which arise from the interplay of stakeholders or institutions, interacting in a system of functions and normative pressures. Systems challenges are the most abstract kinds of challenges because they are derived from intangible interactions and therefore the manifestation or identification of these challenges is often covered by layers of other, less abstract challenges. Taking the water governance landscape of India as an example, 'transparency' could be considered one such system challenge. The challenges around transparency do not derive from single departments, but rather from the interplay of multiple structural, functional and normative features with other challenges. In the case of transparency, it is the interplay of challenges such as corruption, coordination between departments, clarity of funding mechanisms, and lack of oversight with the normative features like the concurrent system and prioritization of economic development that all impact transparency. With systems challenges, it may even be unclear what all the drivers, influencers, or amplifiers are, further complicating both the challenges and solutions. Solutions to

system challenges may additionally be harder to tease out because of this interplay between parts. Solutions also therefore have to be well thought-out in order to avoid problem-shifting and consequences from rash action.

6.3 Discussion

Both Sections 6.1 and 6.2 present larger trends that can be observed through studying the specific enabling and hindering factors that were detailed in Chapter 5. In the context of this research, these synthesized themes and conceptualizations are meaningful for the ways in which they can further support movement toward SDG 6 achievement (explored in Chapter 7, section 7.4). As such, this has implications for the usefulness of 'enabling and hindering factors' as part of the data set in exploring water governance and avenues to SDG 6 achievement.

Using enabling and hindering factors was a useful tool and data set for three main reasons. First, it helped in making more general observations through identifying important trends for enhancing SDG 6 achievability. The suite of factors was the basis for the themes identified in Chapter 6, as well as the conceptualization of water challenges in Section 6.2, so these larger observations would not have been possible without the factors as a data set. Furthermore, the enabling and hindering factors are useful because the clustering of individual factors around these larger trends helps us understand and clarify further where the major problems and solutions may lie for reaching SDG 6 targets. In Section 6.1, this is exemplified through the clustering of factors around the thematic areas, which points to areas that will be important to focus on for SDG 6 achievement. For Section 6.2, looking at where the hindering factors specifically cluster creates a more systematic way to think about addressing impedances to SDG 6 achievement. Last, the use of enabling and hindering factors allows for meaningful aggregation, comparison, and granularity of data through simultaneously allowing for context-specific observances, as well as more generalizable insights. Thus, the enabling and hindering factors let us create a simultaneously nuanced and general view of areas that will be important to address if SDG 6 is to be achieved.

Overall in this chapter, two contributions were explored: the five thematic areas and the conceptualization of water challenges. The five thematic areas – practical considerations, power relations, knowledge and capacity building, policy design, and institutional design – highlight areas

that are important in relation to the enabling and hindering factors for SDG 6. The conceptualization of water challenges for SDG 6 in Section 6.2 identifies six types of challenges that were captured within the hindering factors. Figure 6.1 shows this and further connects those types of challenges to potential levels of response across a fluid water management-to-water governance scale. Each contribution has implications for how to enhance best practices, identify obstacles, and choose suitable solutions.

CHAPTER 7
Conclusion

7.1 Overview

A lot of material was explored, analyzed, and elaborated over the last six chapters, which warrants reflection. In Chapter 1, some of the important background pieces to water governance and SDG 6 were presented, laying the groundwork for the justification of this research. The relevant literature surrounding sustainable development and the SDGs, water governance, and social-ecological systems was explored in Chapter 2, further developing the foundations from which this research was designed. Using a qualitative approach, Chapter 3 explored the object methods, methodology, and the three objectives, as well as detailing relevant field and case study components. Chapter 4-6 addressed each of the three research objectives through exploring the water governance landscape (Chapter 4), presenting data from interviews and focus groups (Chapter 5), and analyzing larger trends from the data (Chapter 6).

SDG 6 was created to delineate a path toward a more sustainable water future. From the history of sustainable development, to learning from multi-level participants, to designing a more systematic approach for enhancing SDG 6 achievability in India, this research has sought to further detail and augment the clarity of the path. As we move forward on sustainability issues in a world where change is compounding complexity, having concrete tools to think about water governance and sustainability, as well as using these tools in practice, will make the difficult road ahead easier to navigate. This chapter will serve to summarize the key findings, discuss implications for the conceptual framework, highlight recommendations for SDG 6 achievability, and reflect on pathways to a more sustainable water future.

7.2 Key Findings

The key findings from this research were explored in Chapters 4-6 and are summarized in Sections 7.2.1 – 7.2.3 by their corresponding objective. Table 7.1 below provides a summary of these key findings.

Table 7.1 – Summary of Key Findings

Summary of Key Findings	
Objective	**Findings**
Objective 1 To explore and analyze the existing water governance mechanisms (institutions, instruments, treaties etc.) that can either facilitate or impede water governance at multiple levels with attention to the SDG 6 on water	❖ The Water Governance Landscape (WGL) concept has utility for better understanding water governance systems ❖ The WGL in India is currently not poised to achieve SDG 6
Objective 2 To capture multi-level experiences around success and failure in water governance for SDG 6 targets, especially key factors contributing to and/or hindering SDG 6 achievement	❖ The suite of enabling and hindering factors is useful as a data set at different scales, as well as for aggregation of data and comparison between scales ❖ Recommendations for participatory and context-sensitive practices in the water governance literature were validated ❖ The four assessment criteria (transparency, accountability, participatory, salience) proposed in the conceptual framework are relevant, but not exhaustive
Objective 3 To synthesize insights and suggest ways in which existing governance mechanisms can be further strengthened on multiple scales in relation to SDG 6	❖ There are five thematic areas derived from the suite of enabling and hindering factors – practical considerations, power relations, knowledge & capacity building, policy design, and institutional design ❖ Hindering factors can be further categorized into six types of challenges – supply, source, socio-cultural, institutional, conceptual, and systems challenges – which have implications for appropriate kinds of action to address them

7.2.1 Objective 1

With regard to Objective 1, there are two key findings: (1) the utility of the water governance landscape and (2) Indian water governance is not poised currently to achieve SDG 6. Considering the former, Chapter 4 related to the water governance landscape as a key empirical contribution. The water governance landscape with its structural, functional, and normative dimensions offers a useful

entry point into thinking about water governance as a complex system. This allows for an understanding of the particular water governance system under investigation where the scale can be flexibly defined on different levels. The idea of the water governance landscape is further supplemented by additional material, including substantive policy and practice information, which is important to a more nuanced understanding of water governance in context.

Considering the latter key finding, understanding the structural, functional, and normative dimensions of a water governance system shows the purpose at which the system aims. Through this method, it became clear in Chapter 4 that the current water governance landscape in India is unlikely to facilitate SDG 6 achievement. This is important to recognize in order to encourage and enable change to take place within water governance in India.

7.2.2 Objective 2

With regard to Objective 2, there are three key findings: (1) the usefulness of enabling and hindering factors, (2) cross-validation of findings in water governance literature, and (3) the relevance of criteria chosen to study SDG 6 achievability. First, the enabling and hindering factors gathered from semi-structured interviews and focus groups reveal a useful suite of factors influencing and impacting water management and governance. This suite of factors is useful because it can be collected at multiple scales, allowing for the importance of context to be highlighted. Inversely, this can also be utilized to aggregate experiences to determine which are more generalizable factors. This suite of factors is also useful because it enables comparison to show similarities and differences between groups. All of these uses illuminate perceptions of water governance, the types of challenges being faced, and potential tools for success.

Another key finding was that recommendations coming out of the water governance literature explored in Chapter 3 are in line with many of the enabling and hindering factors that were identified. This validates the applicability of the recommendations within the context of this research.

The final key finding was the relevance of the criteria chosen to assess and enhance SDG 6. The suite of enabling and hindering factors reinforced that each of the four criteria proposed in the conceptual framework – accountability, transparency, participatory, salience – were relevant (see Chapter 5). While this is true, the suite of enabling and hindering factors also showed that the four

criteria are not comprehensive with all the forces influencing SDG 6 achievement and therefore, the criteria need to be expanded.

7.2.3 Objective 3

There are two major findings that are associated with Objective 3: (1) the five thematic areas and (2) conceptualizing water challenges.

The first key finding is the five thematic areas: practical considerations, power relations, knowledge & capacity building, policy design, and institutional design. As a conceptual tool, the five thematic areas show broad areas that are enabling and hindering the success of water governance in India. This is can be used as a launch point for further investigation and can also be used to identify leverage points depending on where enabling and hindering factors cluster. As a practical tool, the five thematic areas can be helpful in deciphering where it is best to focus efforts and resources in water projects at different scales.

The other key finding is the approach to conceptualizing challenges to water sustainability. There are numerous challenges that can completely derail or impede a well-designed and thought-through policy or program (Medema, McIntosh, and Jeffrey 2008). From case studies and beyond, both academics and practitioners involved in water governance have identified several helpful, context-specific ingredients for successful water governance (Biswas and Tortajada 2010; Ingram 2011; Lautze et al 2011), but 'ingredients for success' is not synonymous with being able to overcome obstacles as they arise. As such, it is paramount that these challenges to successful water governance are thought about, incorporated, addressed, and/or planned for in a more rigorous and systematic manner. This includes identifying what types of challenges are being faced, as well as connecting the types of challenges with appropriate action. This can significantly contribute to the success and sustainability of achieving SDG 6.

7.3 Revisiting and Revising the Conceptual Framework

The key findings summarized above lead to the need for adjustments in the conceptual framework presented originally in Chapter 2. The original conceptual framework for investigating and enhancing the achievement of SDG 6 was presented with factors that the literature suggested

would be helpful in assessment: transparency, accountability, participatory, and salience. These were presented in the conceptual framework in relation to their existence or lack thereof within water governance and its mechanisms. While these do seem to be important given they all appear in the suite of enabling and hindering factors presented in Chapter 5, they are not all-encompassing. Therefore, this area of the conceptual framework in particular needs to modified. Below in Figure 6.2 is the modified conceptual framework that uses the key findings and conclusions of this research to refine the conceptual framework. Namely these modifications are using (1) the water governance landscape, (2) enabling and hindering factors, (3) the water challenges conceptualization, and (4) the thematic areas, which can be contextualized in the mechanisms through SDG 6 achievement is pursued.

These modifications create a more systematic way to assess and enhance SDG 6 achievability. The water governance landscape concept helps delineate the current state of the water governance system with a '*who, what, how, under what paradigms'* approach. It also helps in defining a scale of inquiry by letting the user decide at what scale they want to bound their inquiry. The other three modifications replaced the criteria through which to assess and enhance SDG 6 achievability that were originally proposed. This was done to make the criteria more inclusive of relevant considerations. For instance, determining enabling and hindering factors help define important factors for SDG 6 achievement. They must also be established through talking with people within the system and therefore, the approach to SDG 6 achievement becomes inherently participatory to some extent. Additionally, the thematic areas as focus areas for concerted action or attention also provide a more inclusive and deliberate approach to enhancing SDG 6 achievability. Similarly, using the conceptualization of water challenges contributes to a more considerate incorporation of challenges that can impede water management and governance, as well as what types of actions may be appropriate. Finally, it should be noted an arrow was added in between the 'water governance mechanisms' and 'water governance landscape' boxes connecting them to the 'social-ecological systems' circle. This was done in order to highlight the importance of internalizing human-environment connections and feedbacks into the framework and governance system.

Ultimately, the alterations to the conceptual framework highlight the need and utility of scale-sensitive, process-oriented changes in governance rather than content-based changes in governance. The fundamental argument upon which my research is grounded is that considering all the resources

and attention that have been paid to improving water and sanitation, internationally we have not been achieving our goals (WHO and UNICEF 2014). This includes India in particular where increases in funding for SDG 6 related outcomes have not had corresponding improvements in water access (Shah 2013; WHO and UNICEF 2014). This points to a need to re-examine *how* we go about working toward SDG 6 achievement. The need for a process-oriented approach to water governance and management in a way that embraces the inherent complexity of these systems has been highlighted by many authors. This need is aptly summarized by Pahl-Wostl et al (2010), writing:

> …[T]aking into account complexity in a systematic fashion. Such an approach should support context sensitive analysis without being case specific and thus not transferable. It is evident that such an approach has to adopt a systemic perspective to embrace complexity and the wealth of interactions characterizing governance regimes.

Considering this need, the key findings of this work each support movement toward a more systematic perspective in water governance. The addition of these key contributions to the conceptual framework further supports the value of being able to systemically understand and approach what is needed for SDG 6 achievement. As such, the conceptual framework becomes more of a diagnostic approach, showing a valuable, process-based method for both assessing and enhancing the achievability of SDG 6 targets in India.

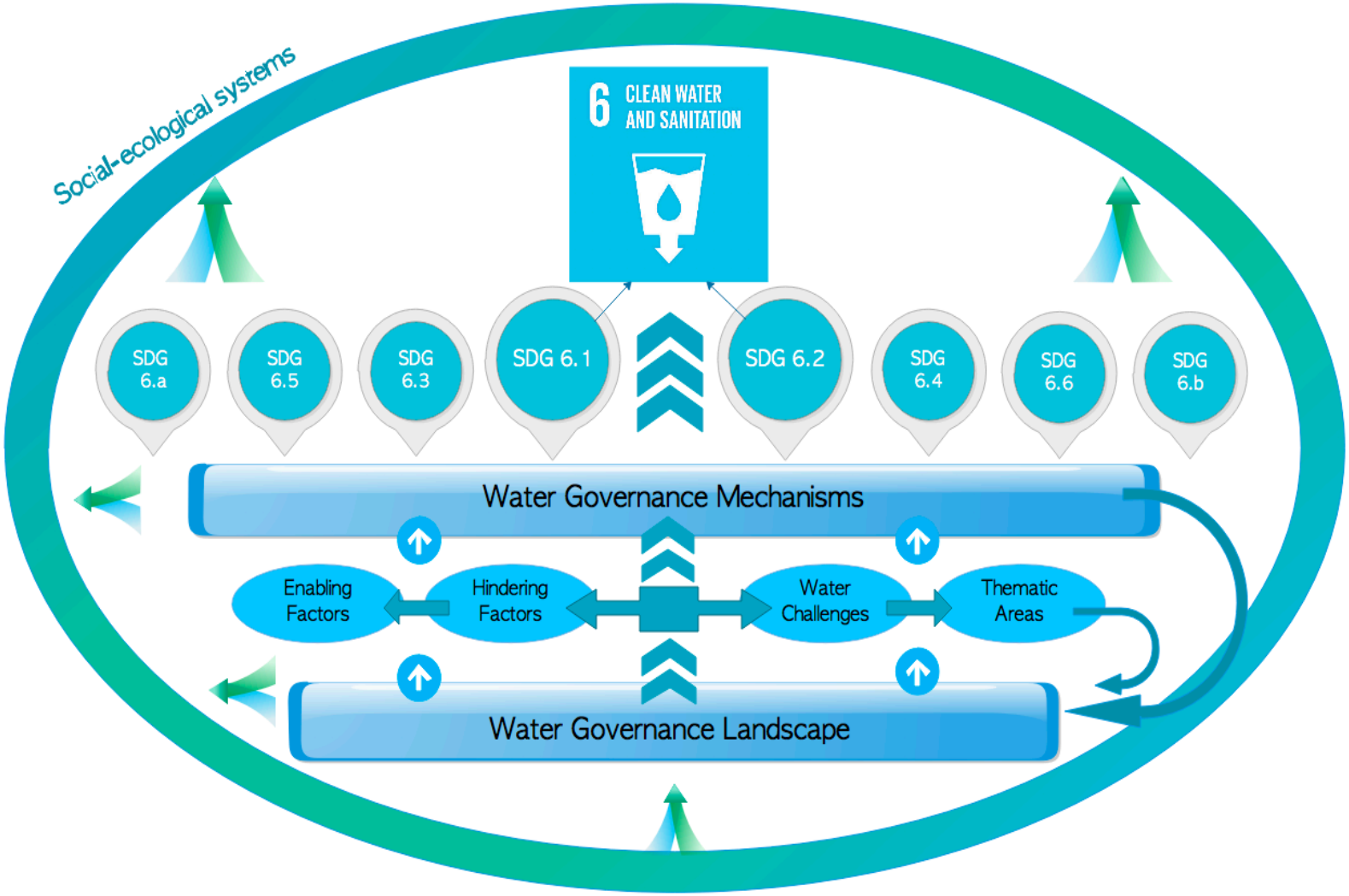


Figure 7.1 – Modified Conceptual Framework

7.4 Recommendations for SDG 6

There are a few recommendations that are derived from the key findings of this research specific to enhancing the possibility of SDG 6 achievement. These are detailed below with specific recommendations for India, the international level, and future research. There is no particular order of priority for the recommendations. Table 7.2 provides a summary of the recommendations.

Table 7.2 – Summary of Recommendations

Summary of Recommendations	
Area	**Recommendations**
India	❖ Address gaps and disconnects in the WGL ❖ Context-specificity and scaled approaches ❖ Collaboration ❖ Use of the five thematic areas ❖ Use of identifying challenges in order to use appropriate actions to address
International	❖ More holistic and salient indicators for SDG 6 ❖ Considering use of key findings from Objective 3 to inform action toward SDG 6 achievement
Future Research	❖ International water governance landscape ❖ Further look at SDG 6.4 on agriculture ❖ Detailed studies on each SDG 6 target ❖ Water nexuses & externalities ❖ Facilitating systemic transformation in water governance

7.4.1 Recommendations for National Level Policy and Practice

India is undergoing transition in its water governance systems as it seeks to have better policies and practices that incorporate the concept of social-ecological systems and accounting for the importance of human-environment connections (Shah 2013). This trend was highlighted by many participants involved in the study, as well as numerous others who talked with me throughout the course of this research. While this trajectory of change is promising, there are five major recommendations for India to further accelerate its progress toward SDG 6 achievement: (1) addressing gaps and disconnects in the water governance landscape, (2) use of context specificity, and (3) highlighting collaboration, as well as the use of (4) the five thematic areas and (5) conceptualization of water challenges from this research.

It is imperative that the water governance landscape in India shift to address the gaps and disconnects identified in Chapter 4, Section 4.3. This includes addressing the dearth of peri-urban considerations, the lapses in communication and concerted action amongst the stakeholders, and encouraging more feedback across the water governance system. These adjustments will make the WGL in India reflect the aim of achieving SDG 6 more closely and further poise the WGL in India to better achieve SDG 6.

The use of multi-level perspectives in the data revealed there are some general learnings across the levels, but also that there are some scaled, context-specific considerations. This highlights the need for context-specificity in addressing SDG 6 that incorporates the notion of scale. Being sensitive to the nuances and needs of different scales will further enhance the achievability of SDG 6 at these different levels because if SDG 6 achievability is enhanced at one scale, it contributes to the overall achievability.

Because water is a point of contention and an instrumental driver in many recent conflicts in India, specific efforts focused on mitigating conflict and encouraging collaboration around water are recommended. This should include concerted efforts to involve and connect stakeholders throughout the WGL and bring in untraditional partners such as industries who are driving economic pressures on water resources. This should also be highlighted in the context of the thematic area of 'power relations'. It is important that efforts toward collaboration in water governance for SDG 6 are done while also recognizing and accounting for disparities in power amongst the different stakeholders, including political and socio-cultural aspects. Highlighting collaboration over contention will enhance the achievability of SDG 6 in India.

Sections 6.1 and 6.2 in Chapter 6 respectively offer two further considerations surrounding SDG 6 achievability and they each have implications for action toward that goal. First, the five thematic areas in Section 6.1 are indicative of areas to pay attention to considering future decision-making and actions. The themes are areas of concern that must be considered around action on SDG 6 targets. While these themes are really just a broader summary of the more specific enabling and hindering factors, the themes can also be seen as focus areas for action. The clustering of enabling and hindering factors around these broader themes means that action within these focus areas will be important in determining the success of water governance in India in general and specifically for

achieving the SDG 6 target 6.1. The thematic areas can then be understood as both conceptual summaries, as well as areas that will need focused attention and action across the water governance landscape of India if SDG 6 is to be achieved.

While there is much to learn from instances of success, the challenges are particularly meaningful for pathways to a more sustainable water future in India considering numerous challenges can derail otherwise well-planned and designed water initiatives. The conceptualization of challenges to water sustainability presented in Figure 6.1 is therefore valuable for a few different reasons. It is integral that as pathways to a sustainable water future are delineated, water stakeholders use this conceptualization to more intimately understand the challenges to realizing this future. This conceptualization of the types of water challenges faced in the context of SDG 6 targets can be ultimately understood as a way to help answer questions of fit between context, challenges, goals, and action. The multi-dimensionality of and interplay between the challenges being faced in the water sector means pathways for action are not always clear. This highlights the need for a more systematic way to answer questions of fit between challenges and action that incorporates scale and context. In that way, this conceptualization of challenges to water sustainability is valuable as a more systematic process through which to think about and act against challenges. This includes an applicability to actions around policy design that enables the kinds of challenges across varied contexts to be understood and connected back to appropriate actions.

7.4.2 Recommendations for international water governance for SDG 6

For the international scale, there are two major recommendations: (1) improving the indicators for SDG 6 and (2) considering use of the five thematic areas from this research. In Chapter 2, the shortcomings of the indicators for SDG 6 were discussed. In summary, the current indicators for SDG 6 targets mainly show if the numerical components of the target have been hit. This does not allow for any indicators of how it was achieved or delineate if they can be maintained over time. A paradigm shift from using just quantitative indicators to using both quantitative and qualitative data and indicators will make the picture of actual SDG 6 progress more robust. Because SDG 6 highlights water security which is a question about access over time, it is also necessary to use both quantitative and qualitative data in order for indicators to actually measure water security. Additionally, qualitative data will allow for the processes around water governance to be highlighted and answer

how our water goals are being achieved, not just *if* they are being achieved because the means matter in the world of water governance.

SDG 6 has specific targets identified to be hit, but does not specifically advocate for how to go about achieving these targets. This is in the context of many efforts around the world to reach similar targets having resulted in failure, for example the underperformance of the African continent on the MDG 7 with targets for clean water and sanitation (Easterly 2009; Tumushabe 2017). This means despite the resources being allocated to water sustainability issues, it does not necessarily translate to sustained success. This calls for reflection on how the key findings in this research may contribute to further improving the governance processes aimed at achieving SDG 6. Considering the key findings of this research, use of the five thematic areas and the conceptualization of water challenges to inform action toward SDG 6 may enhance the overall achievability of SDG 6 globally. With the thematic areas, these may highlight future direction for efforts such as through program design and investment. As people face challenges to water sustainability and therefore SDG 6 achievement all over the world, using a more systematic approach to recognizing and addressing challenges will contribute to the prospects of SDG 6 being achieved. Though this research was conducted in India and therefore the key findings of this work pertain specifically to India, there may still be generalizable to the international context. Even if not, it does highlight the need for meaningful reflection on the international scale toward how to address the need for process-based transformations in water governance systems.

7.4.3 Recommendations for future research

While there are many valuable outcomes from this research, it is clear that there are numerous areas which need to be further explored. Some of these were explicit boundaries noted in the scope of this research and others became clear over the course of the project.

Explicitly, the international water governance landscape and the leviathan of agriculture in SDG 6.4 were placed outside the scope of this research. This is because each requires a more in-depth investigation in relation to SDG 6 and could constitute its own study. Therefore, future research aimed at these two subjects is warranted. Additionally, this study focused on SDG 6.1 and 6.2, with peripheral consideration given to the other SDG 6 targets. Each target involves nuance and a specific

subject area, so future research that studies each specifically would be helpful for enhancing SDG 6 achievement as well.

The need for more research on transformation in water governance systems, as well as around water nexuses emerged from this work. The need for research on transformation is noted especially since the current systems have failed historically to meet water goals and systemic transformation may be necessary to cope with changes and complexity. The idea of 'water nexuses' where certain aspects of water and society affect each other was also seen in this research. There may be key connect areas in water sustainability that need to be addressed in tandem with societal concerns or other resources, so further investigation into the water nexus concept is also recommended. Identifying key interplays that help and hinder SDG 6 outside the water world will enable SDG 6 further.

7.5 Final Reflections

Much as with recognizing the importance of addressing water challenges, there are barriers that should be addressed in relation to this work. First and foremost, despite the attention and resources that have been given to advancing progress on water issues around the world, many water issues still persist. Additionally, while this research focused on SDG 6 targets 6.1 and 6.2, the six other SDG 6 targets are only peripherally addressed here and make the picture of water governance for SDG 6 achievement more complex. Finally, the context of climate change increases complexity further, compounds some problems, and shifts others, highlighting the nuance and challenge of delicate interlinkages surrounding water.

While there are barriers, there are also numerous opportunities that come out of this work. The areas identified above for further research are important opportunities to advance knowledge and practice surrounding water governance and enhancing SDG 6 achievability. Additionally, the opportunities and need for collaboration that are highlighted throughout this work are exciting as progress toward SDG 6 achievement will not be able to happen in isolation or from government efforts alone. Finally, the opportunities for positive transformation and the acceleration of change through SDG 6 achievement that can come from this work are important and exciting as well.

On a personal note, it has been an extremely difficult, rewarding, and transformational process to explore the question of enhancing SDG 6 achievability in India. It was immensely challenging to scope this research as water tends to flow across both conceptual, practical, and geographic borders, as well as touch just about every piece of social and ecological systems. Focusing on the provisioning of water (SDG 6.1) and issues of sanitation (SDG 6.2) allowed me to have a more manageable scope. The intricacies and interconnections in water governance across other systems were extremely valuable to explore as well, particularly the environmental systems more explicitly addressed in SDG 6 targets 6.3-6.6. Traveling to India to do my fieldwork and getting to be immersed there was one of the most gratifying parts of this research. From the connections, I made to the communities I worked with to the doors it has opened for future projects, I am expressly thankful for the rewarding and transformative experience of working in India. The nuance and contextual-appreciation that this work seeks to have would not have been possible without being in India and having my worldview expanded.

While many people are pessimistic around the ability to actually achieve SDG 6, I am optimistic about the opportunities that walking the path toward SDG 6 achievement brings and utterly inspired by the people around the world and in India who are lighting the way toward a more sustainable water future.

Bibliography

Aguilar, D. 2011. Groundwater Reform in India: An Equity and Sustainability Dilemma. *Texas International Law Journal* 46: 623-653.

Alessandrini, M. 2012. Non-positivist Approaches to Research in the Third Sector: Empowered Policy-making. International Society for Third-Sector Research Conference Working Papers Series Volume VIII. 10-13 July 2012. Siena, Italy: 1-17.

Allen, A. 2003. Environmental planning and management of the peri-urban interface: perspectives on an emerging field. *Environment and Urbanization* 15(1): 135-148.

Allen, A., J.D. Dávila, and P. Hofmann. 2006a. The peri-urban water poor: citizens or consumers? *Environment and Urbanization* 18(2): 333-351.

Allen, A., J.D. Dávila, and P. Hofmann. 2006b. *Governance of Water and Sanitation Services for the Peri-urban Poor: a framework for understanding and action in metropolitan regions.* Development Planning Unit, UCL: London.

Allen, C., G. Metternicht, and T. Wiedmann. 2017. An Iterative Framework for National Scenario Modelling for the Sustainable Development Goals (SDGs). *Sustainable Development*)25(5): 372-385.

Armitage, D. 2008. Governance and the Commons in a Multi-Level World. International Journal of the Commons. 2(1): 7-32.

Armitage, D., M. Marschke, and R. Plummer. 2008. Adaptive Co-Management and the Paradox of Learning. Global Environmental Change. 18(1): 86-98.

Armitage, D., R. Plummer, F. Berkes, R. Arthur, A. Charles, I. Davidson-Hunt, A. Diduck, N. Doubleday, D. Johnson, M. Marschke, P. McConney, E. Pinkerton, and L. Wollenberg. 2009. Adaptive co-management for social-ecological complexity. Frontiers in Ecology and the Environment. 7(2): 95-102.

Armitage, D., S. Alexander, M. Andrachuk, S. Berdej, T. Dyck, P.K. Nayak, J. Pittman, and K. Rathwell**.** 2015. Emerging concepts in adaptive management. In C.R. Allen and A.S. Garmestani (Eds.), *Adaptive Management of Social-ecological Systems.* Springer, Netherlands: 235-254.

Arora, R.K. and R. Goyal. 1995. *Indian Public Administration: Institutions and Issues.* Delhi: Wishwa Prakashan.

Asian Development Bank (ADB) (2013). Asian Water Development Outlook 2013: Measuring Water Security in Asia and the Pacific. ADB, Manila: 128.

Attaran, A. 2005. An Immeasurable Crisis? A Criticism of the Millennium Development Goals and Why They Cannot Be Measured. *PLOS Medicine* 2(10): e318.

Bandyopadhyay, J. 1987. Political Ecology of Drought and Water Scarcity: Need for an Ecological Water Resources Policy. *Economic and Political Weekly* 22(50): 2159-2161 + 2163-2169.

Bakker, K. 2007. The "commons" versus the "commodity": alter-globalization, anti-privatization and the human right to water in the global south. *Antipode* 39(3): 430-455.

Bakker, K. 2010. *Privatizing Water: governance failure and the world's urban water crisis.* Ithaca, New York: Cornell University Press.

Bakshi, P. and S. Kashyap. 2011. *The Constitution of India.* Universal Law Publishing: New Delhi.

Bartram, J. and S. Cairncross. 2010. Hygiene, Sanitation, and Water: Forgotten Foundations of Health. *PLoS Med* 7(11): e1000367.

Beder, S. 2000. Costing the Earth: Equity, Sustainable Development and Environmental Economics. *New Zealand Journal of Environmental Law* 4: 227-243.

Berkes, F. 2009. Evolution of Co-Management: Role of Knowledge Generation, Bridging Organizations and Social Learning. *Journal of Environmental Management* 90(5): 1692–1702.

Berkes, F. and C. Folke (Eds). 1998. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience.* Cambridge University Press: New York.

Biermann, F. 2014. The Anthropocene: A governance perspective. *The Anthropocene Review* 1(1): 57-61.

Biermann, F., M.M. Betsill, J. Gupta et al. 2009. Earth System Governance: People, Places and the Planet. Science and Implementation Plan of the Earth System Governance Project. ESG Report 1. Bonn, IHDP: The Earth System Governance Project.

Bingeman, K., F. Berkes, and J.S. Gardner. 2004. Institutional responses to development pressures: Resilience of social-ecological systems in Himachal Pradesh, India. *International Journal of Sustainable Development and World Ecology* 11: 99–115.

Birkenholtz, T. 2010. 'Full-Cost Recovery': Producing Differentiated Water Collection Practices and Responses to Centralized Water Networks in Jaipur, India. *Environment and Planning A* 42(9): 2238-2253.

Biswas, A. 2004. Integrated Water Resources Management: A Reassessment. *Water International Journal* 29(2): 248-256.

Biswas, A.K. and C. Tortajada. 2010. Future Water Governance: Problems and Perspectives. *Water Resources Development* 26(2): 129-139.

Biswas, A. 2012. A Framework for Rural Drinking Water Quality Management: Collating Experiences from the Voluntary Sector, Learning Document Issue No. 3. Bangalore: Arghyam.

Blackden, C.M. and Q. Wodon. 2006. *Gender, Time Use, and Poverty in sub-Saharan Africa*. Washington, D.C.: The World Bank.

Boham, J. 1999. International Regimes and Democratic Governance: Political Equality and Influence in Global Institutions. *International Affairs,* 75(3): 499-513.

Bose, A. 2003. Consumer Demographics: People's Assets in Census 2001. *Economic and Political Weekly* 38(39): 4087-4089.

Brisbois, M.C. and R.C de Loë. 2016. Power in Collaborative Approaches to Governance for Water: A Systematic Review. *Society & Natural Resources* 29(7): 775-790.

Brundtland, G.H. and World Commission on Environment and Development (WCED). 1987. *Our Common Future: report of the World Commission on Environment and Development.* Oxford University Press: Oxford, UK.

Cancian, F. 1996. Participatory Research and Alternative Strategies for Activist Sociology, In: Gottfried, H. (Ed). *Feminism and Social Change: Bridging theory and practice.* Chicago: University of Illinois Press. 187-195.

Cash, D.W., W.N. Adger, F. Berkes, P. Garden, L. Lebel, P. Olsson, L. Pritchard, and O. Young. 2006. Scale and Cross-Scale Dynamics: Governance and Information in a Multilevel World. *Ecology and Society* 11(2): 8-19.

Clemens, M. and T. Moss. 2005. What's Wrong with the Millennium Development Goals? Brief from the Center for Global Development.

Conca, K. 2005. *Governing Water*: *Contentious Transnational Politics and Global Institution Building*. USA: MIT Press.

Conca, K. 2015. Which risks get managed? Addressing climate effects in the context of evolving water-governance institutions. *Water Alternatives* 8(3): 301-316

Conrad, C. and K. Hilchey. 2010. A review of citizen science and community-based environmental monitoring: issues and opportunities. *Environmental Monitoring and Assessment,* 176(1-4): 273-291.

Creswell, J.W. 2013. *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J.W. 2014. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (4th ed.). Sage Publications: Thousand Oaks, CA.

Cronin, A.A., A. Prakash, S. Priya and S. Coates. 2014. Water in India: situation and prospects. *Water Policy* 16(3): 425-441.

Cronin, A.A., A. Prakash, S. Priya and S. Coates. 2016. Drinking Water Supply in India: Context and Prospects. In: Narain, V. and A. Narayanamoorthy (eds.). *Indian Water Policy at the Crossroads: Resources, Technology and Reforms. Global Issues in Water Policy*. Springer, Cham: 49-71.

D'Cruz, H., P. Gillingham, and S. Melendez. 2007. Reflexivity, its Meanings and Relevance for Social Work: A Critical Review of the Literature. *The British Journal of Social Work* 37(1): 73-90.

D'Souza, R. 2002. At the confluence of law and geography: contextualizing inter-state water disputes in India. *Geoforum* 33(2): 255-269.

Daly, Herman E. 1990. Toward some operational principles of sustainable development. *Ecological Economics* 2: 1-6.

de Loë, R.C., J. Varghese, C. Ferreyra, and R.D. Kreutzwiser. 2007. Water Allocation and Water Security in Canada: Initiating a Policy Dialogue for the 21st Century. Report prepared for the Walter and Duncan Gordon Foundation. Guelph, ON: Guelph Water Management Group, University of Guelph.

de Loë, R. and J. Patterson. 2017. Rethinking Water Governance: moving beyond water-centric perspectives in a connected and changing world. *Natural Resources Journal* 57(1): 75-99.

du Toit, D. and S. Pollard. 2008. Updating public participation in IWRM: a proposal for a focused and structure engagement with Catchment Management Strategies. *Water SA,* 34(6): 707-713.

Department of Drinking Water Supply. 2010. "National Rural Drinking Water Programme: Movement towards Ensuring People's Drinking Water Security in Rural India," Ministry of Rural Development, Government of India.

Desai, S. 1994. "Women's burdens: easing the structural constraints," in: Sen, G., A. Germain, L.C. Chen (Eds). *Population policies reconsidered: health, empowerment, and rights.* Boston, Massachusetts, Harvard Center for Population and Development Studies: 139-50.

Doelle, M. and W. Lahey. 2013. Putting the Train of Environmental Governance Back on Track:

Nova Scotia's Experiment in Using Legislation to Strengthen Environmental Governance. (June 2, 2013)

Donahue, M.J. 1999. The Case for Good Government: Why a Comprehensive Review of the Great Lakes Water Quality Agreement is Needed. *Toledo Journal of Great Lakes Law: Science & Policy* 2(1): 1-12.

Drèze, J. and A. Sen. 2013. *An Uncertain Glory: India and its Contradictions.* USA: Princeton University Press. P41, 43.

Easterly, W. 2009. How the Millennium Development Goals are unfair to Africa. *World Development* 37(1): 26-35.

Engle, N., O. Johns, M. Carmen Lemos and D. Nelson. 2011. Integrated and Adaptive Management of Water Resources: Tensions, Legacies, and the Next Best Thing. *Ecology and Society* 16(1): 19-29.

Fabricius, C. and C. Currie. 2015. Adaptive Co-Management. In: C. Allen and A. Garmestani (eds.). *Adaptive Management of Social-Ecological Systems*. Springer: USA.

Farrelly, M. and R. Brown. 2011. Rethinking urban water management: Experimentation as a way forward? *Global Environmental Change* 21(2): 721-732.

Fehling, M., B.D. Nelson, and S. Venkatapuram. 2013. Limitations of the Millennium Development Goals: a literature review. *Global Public Health* 8(10): 1109-1122.

Foerster, A.C. 2011. Developing purposeful and adaptive institutions for effective environmental water governance. *Water Resources Management.* 25(15): 4005-4018

Folke, C., S. Carpenter, T. Elmqvist, L. Gunderson, C. Holling, and B. Walker. 2002. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *AMBIO: A Journal of the human Environment* 31(5): 437-440.

Franks, T. and F. Cleaver. 2007. Water governance and poverty: a framework for analysis. *Progress in Development Studies* 7(4): 291-306

Fukuyama, F. 2005. *State Building: Governance and World Order in the 21st Century.* USA: Cornell University Press.

Gawne, B., L. Crase, and A. Watson. 2010. Can a collaborative focus on solutions improve our capacity to achieve sustainable water management? *Marine and Freshwater Research* 61(7): 814-820.

Ghurye, G.S. 1969. *Caste and Race in India*. Routledge: London, UK.

Giordano, M. and T. Shah. 2014. From IWRM back to integrated water resources management. *International Journal of Water Resources Development* 30(3): 364-376.

Glasbergen, P., F. Biermann, and A.P.J. Mol (Eds). 2007. *Partnerships, Governance and Sustainable Development: Reflections on Theory and Practice*. Cheltenham, UK: Edward Elgar Publishing Limited.

Gleick, Peter. 2009. *The World's Water 2008-2009: The Biennial Report on Freshwater Resources*. Island Press: multiple locations.

Goldman, M. 2007. How "Water for All!" policy became hegemonic: The power of the World Bank and its transnational policy networks, *Geoforum* 38(5): 786-800.

Government of Canada. "Drinking water advisories: First Nations south of 60." https://www.canada.ca/en/health-canada/topics/health-environment/water-quality-health/drinking-water/advisories-first-nations-south-60.html#2 Accessed on December 4, 2017.

Government of India. 2011. "2011 Census Data," Ministry of Home Affairs. http://www.censusindia.gov.in/2011-Common/CensusData2011.html Accessed on May 17, 2017

Government of India. "All Ministries / Independent Orgs," Right to Information. http://rti.gov.in/rti/allministry.asp Accessed May 17, 2017

Government of India. "Ministry of Agriculture & Farmers Welfare (MAFW)". http://agriculture.gov.in/ Accessed May 17, 2017

Government of India. "Ministry of Drinking Water and Sanitation (MDWS)." http://www.mdws.gov.in/ Accessed May 17, 2017.

Government of India. "Ministry of Environment, Forest and Climate Change (MEFCC)". http://www.envfor.nic.in/ Accessed May 17, 2017

Government of India. "Ministry of Shipping". http://shipping.nic.in/ Accessed May 17, 2017

Government of India. Ministry of Water Resources (MoWR). http://mowr.gov.in/ Accessed May 17, 2017

Government of Karnataka. "Karnataka Panchayat Raj Act 1993," Department of Law and Parliamentary Affairs. 159-163.

Graham, S., R. Desai, and C. McFarlane. 2013. Water Wars in Mumbai. *Public Culture* 25(1/69): 115-141.

Grigg, N. 1996. *Water resources management: Principles, regulations and cases.* USA: McGraw Hill.

Griggs, D., M. Stafford-Smith, O. Gaffney, J. Rockström, M.C. Öhman, P. Shyamsundar, W. Steffan, G. Glaser, N. Kanie, and I. Noble. 2013. Policy: Sustainable development goals for people and planet. *Nature* 495 (1): 305-307.

Grin, j., J. Rotmans J. Schot, F. Geels and D. Loorbach. 2010. *Transitions to sustainable development: New directions in the study of long term transformative change.* Routledge: New York.

Groenfeldt, D. and J. Schmidt. 2013. Ethics and Water Governance. *Ecology and Society*. 18(1): 14

Gunyon, W. 1998. Making Government Funding Work Harder. A WaterAid Report. London: WaterAid.

Gupta, J., C. Pahl-Wostl, and R. Zondervan. 2013. 'Glocal' water governance: a multi-level challenge in the Anthropocene. *Current Opinion in Environmental Sustainability* 5: 573-580

Halbe, J., C. Pahl-Wostl, J. Sendzimir and J. Adamowski. 2013. Towards adaptive and integrated management paradigms to meet the challenges of water governance, *Water Science and Technology* 67(11): 2651- 2660.

Hanrahan, M., A. Sarkar, and A. Hudson. 2016. Water insecurity in Indigenous Canada: a community-based inter-disciplinary approach. *Water Quality Research Journal* 51(3): 270-281.

Haq, R. 2013. Intersectionality of gender and other forms of identity: Dilemmas and challenges facing women in India. *Gender in Management* 28(3): 171-184.

Hardgrave, R.L. 1993. India: The Dilemmas of Diversity. *Journal of Democracy* 4(4): 54-68.

Head, J.W. 1977. The Challenge of International Environmental Management: A Critique of the United Nations Environment Programme. *Virginia Journal of International Law* 18(2): 269-288.

Higgins, K. 2013. Reflecting on the MDGs and Making Sense of the Post-2015 Development Agenda. The North-South Institute. http://www.nsi-ins.ca/wp-content/uploads/2013/05/2013-Post-2015.pdf

Hoff, K. 2016. "Caste System," World Bank Policy Research Working Paper No. 7929. Available at

SSRN: https://ssrn.com/abstract=2890712

Holling, C., F. Berkes, and C. Folke. 1998. Science, sustainability and resources management. In: Berkes, F., C. Folke, and J. Colding (Eds). 1998. *Linking Social and Ecological Systems: Management practices and social mechanisms for building resilience.* Cambridge, UK: Cambridge University Press

Holzinger, K. and C. Knill. 2005. Causes and conditions of cross-national policy convergence. *Journal of European Public Policy* 12(5): 775-796.

Huitema, D., E. Mostert, W. Egas, S. Moellenkamp, C. Pahl-Wostl and R. Yalcin. 2009. Adaptive Water Governance: Assessing the Institutional Prescriptions of Adaptive (Co-)Management from a Governance Perspective and Defining a Research Agenda. *Ecology and Society* 14(1): 26-44.

Hutchings, P., R. Franceys, S. Smits and S. Mekala. 2017. *Community Management of Rural water Supply: Case studies of success from India.* New York: Routledge.

Ingram, H. 2008. Beyond Universal Remedies in Water Governance: A Political and Contextual Approach. 6th Rosenburg water policy forum.

Inukonda, S. 2017. Deliberating Reforms: Public-Private Partnerships in Indian Water and Sewerage Sector. *IUP Journal of Business Strategy* 14(1): 34-51.

Islam, M.R. 2014. Ageism and Age Discrimination in Old Age: An Overview. *Philoisophy and Progress* 55(1-2): 91-108.

Jose, J. and S. Cherayi. 2017. Social Exclusion of Older Persons: The Role of Socio-Demographic Characteristics. *Ageing International* 42(4): 447-465.

Kates, R.W., T.M. Parris, and A.A. Leiserowitz. 2005. What is Sustainable Development? Goals, indicators, values, and practice. *Environment* 47(3): 8-21.

Kooiman, J. and M. Bavinck. 2005. The governance perspective. In: Kooiman, J., M. Bavinck, S. Jentoft, and R. Pullin (Eds). *Fish for life. Interactive governance for fisheries.* Amsterdam University Press: Amsterdam. 11-24.

Kumar, M.D. 2009. *Water Management in India: What Works, What Doesn't*. New Delhi: Gyan Publishing.

Langley, P. 2001. Transparency in the Making of Global Environmental Governance. *Global Society* 15(1): 73-92.

Lautze, J., S. de Silva, M. Giordano, and L. Sanford. 2011. Putting the cart before the horse:

Water governance and IWRM. *Natural Resources Forum* 35(1): 1-8.

Lele, S. 2000. Godsend, sleight of hand, or just muddling through: Joint water and forest management in India. *Natural Resources Perspectives* 53: 1-6.

Lele, S., V. Srinivasan, P. Jamwal, B. Thomas, M. Eswar, and T. Zuhail. 2013. Water Management in Arkavathy basin: a situation analysis. Discussion Paper – Ashoka Trust for Research in Ecology and the Environment, Bangalore.

Lele, S. 2017. Sustainable Development Goal 6: watering down justice concerns. *WIREs Water,* e1224.

Linneck, S. 2016. An Ethnographic Approach to Understanding Preferences for Water Supply and Treatment in Rural India. Thesis in fulfillment of MSc by Research. Cranfield University.

Locke, E. and G. Latham. 2006. New Directions in Goal-Setting Theory. *Current Directions in Psychological Science,* 15(5): 265-268.

Matondo, J. 2002. A comparison between conventional and integrated water resources planning and management. *Physics and Chemistry of the Earth* 27(11-22): 831-838.

Mawdsley, E. and S. Roychoudhury. 2016. Civil society organisations and Indian development assistance: emerging roles for commentators, collaborators, and critics. In: Chaturvedi, S. and A. Mulakala (eds.). *India's Approach to Development Cooperation*.

McKenzie, D. and I. Ray. 2009. Urban water supply in India: status, reform options and possible lessons. *Water Policy* 11($): 442-460.

Meadows, D.H. 1972. *The Limits to growth; a report for the Club of Rome's project on the predicament of mankind.* New York: Universe Books.

Meadows, D. 2008. *Thinking in Systems.* Chelsea Green Publishing: White River Junction, Vermont.

Medema, W., B. McIntosh, and P.J. Jeffrey. 2008. From premise to practice: a critical assessment of integrated water resources management and adaptive management approaches in the water sector. *Ecology and Society* 13(2): 29-46.

Mehta, L. 2007. Whose scarcity? Whose property? The case of water in western India. *Land Use Policy* 24(4): 654-663.

Mehta, A.K. and A. Shah. 2003. Chronic Poverty in India: Incidence, Causes and Policies. *World Development* 31(3): 491-511.

Meinzen-Dick, R. and M. Zwarteveen. 1998. Gendered participation in water management: Issues

and illustrations from water users' associations in South Asia. *Agriculture and Human Values* 15(4): 337-345.

Meinzen-Dick, R. 2007. Beyond panaceas in water institutions, *PNAS* 104(39): 15200-15205.

Meissner, R. 2014. Paradigms and theories in water governance: The case of South Africa's National Water Resource Strategy, Second Edition. *Water SA* 42(1): online.

Merriam-Webster. "Definition of normative," Accessed September 27, 2017. https://www.merriam-webster.com/dictionary/normative

Mertens, D. 2009. *Transformative research and evaluation.* New York: Guilford.

Meyer, J. and R. Wieringa. (eds.) 1993. *Deontic logic in computer science: Normative systems specification*. USA: Wiley.

Miller, S. 2007. "Social Institutions," in Stanford Encyclopedia of Philosophy.

Ministry of Drinking Water & Sanitation. 2013. "National Rural Drinking Water Program: Framework for Implementation," Government of India. http://mdws.gov.in/sites/default/files/NRDWP_Guidelines_2013.pdf

Ministry of Drinking Water & Sanitation. "Water Security Pilot Projects," http://mdws.gov.in/water-security-pilot-projects Accessed December 4, 2017

Ministry of Water Resources. 2012. "National Water Policy," Government of India. http://wrmin.nic.in/writereaddata/NationalWaterPolicy/NWP2012Eng6495132651.pdf

Moghaddam, A. 2006. Coding issues in grounded theory. *Issues in Educational Research* 16(1): 52-66.

Mollinga, P. 2005. The water resources policy process in India: Centralisation, polarisation and new demands on governance, ZEF Working Paper Series, No. 7, http://nbn-resolving.de/urn:nbn:de:0202-2008091160

Mollinga, P., R. Meinzen-Dick, and D. Merrey. 2007. Politics, Plurality and Problemsheds: A strategic approach for reform of agricultural water resources management. *Development Policy Review* 25(6): 699-719.

Morgan, C., A.B. McBratney, D.J. Field, A. Koch, J. Bouma and F. Carré. 2017. Synthesis: Goals to Achieve Soil Security. In: Field D.J., C.L.S. Morgan, and A.B. McBratney (Eds.), *Global Soil Security: Progress in Soil Science.* Switzerland: Springer.

Najar, N. 2016. "Violence Erupts in Southern India Over Order to Share Water," in *The New York Times.* Online Source first published September 12, 2017. Accessed June 14th, 2017. https://www.nytimes.com/2016/09/13/world/asia/violence-erupts-in-southern-india-over-order-to-share-water.html

Nayak, P.K., D. Armitage, and M. Andrachuk. 2016. Power and politics of social-ecological regime shifts in the Chilika lagoon, India and Tam Giang lagoon, Vietnam. *Regional Environmental Change* 16(2): 325-339.

Nayak, P. K. and F. Berkes. 2014. Linking global drivers with local and regional change: A social-ecological system approach in Chilika Lagoon, Bay of Bengal. *Regional Environmental Change* 14(6): 2067-2078.

Nayak, P. K. 2015. Institutional Pluralism, Multilevel Arrangements and Polycentricism: The Case of Chilika Lagoon, India. In: M. Bavinck A. and A. Jyotishi (Eds). 2015. *Conflict, Negotiations and Natural Resource Management: A legal pluralism perspective from India*. London: Routledge.

Neef, A. 2009. Transforming Rural Water Governance: Toward deliberative and polycentric models? *Water Alternatives* 2(1): 53-60.

Neuman, Y. and Z. Bekerman. 2001. Cultural Resources and the Gap Between Educational Theory and Practice. *Teachers College Record* 103(3): 471-484.

Neuman, W. 2007. The Meanings of Methodology, In: Neuman, L. (Ed.), *Social Research Methods: Qualitative and Quantitative Approaches* (3rd ed.). Boston, Massachusetts: Allyn and Bacon.

Newig, J. and T. Koontz. 2014. Multi-level governance, policy implementation and participation: the EU's mandated participatory planning approach to implementing environmental policy, *Journal of European Public Policy* 21(2): 248-267.

Nile Basin Initiative. http://nilebasin.org/ Accessed May 17, 2017.

O'Brien, R. and S. Browne. 2015. "SDGs: Fit for the Future?" Future United Nations Development System. https://www.futureun.org/media/archive1/briefings/FUNDS_Brief29_May2015_SDGs_FitForFuture_Post2015.pdf

Olsson, P., C. Folke and F. Berkes. 2004. Adaptive Comanagement for Building Resilience in Social-Ecological Systems, *Environmental Management* 34(1): 75-90.

Ostrom, E. 2007. A diagnostic approach for going beyond Panaceas. *Proceedings of the National*

Academy of Sciences of the USA 104(39): 15181–15187.

Ostrom, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems, *Science* 325(5939): 419-422.

Pahl-Wostl, C. 2007. Transitions towards adaptive management of water facing climate and global change, *Water Resources Management* 21: 49-62.

Pahl-Wostl, C., D. Tàbara, R. Bouwen, M. Craps, A. Dewulf, E. Mostert, D. Ridder, and T. Taillieu. 2008. The importance of social learning and culture for sustainable water management. *Ecological Economics* 64(3): 484-495.

Pahl-Wostl, C., G. Holtz, B. Kastens, and C. Knieper. 2010. Analyzing complex water governance regimes: the Management and Transition Framework. *Environmental Science & Policy* 13: 579. (571-581)

Pahl-Wostl, C., K. Conca, A. Kramer, J. Maestu, and F. Schmidt. 2013. Missing links in global water governance: a processes-oriented analysis. *Ecology and Society* 18(2): 33.

Pahl-Wostl, C. 2015. *Water Governance in the Face of Global Change: From Understanding to Transformation.* Switzerland: Springer.

Parasuraman, S. 1999. *The Development Dilemma: Displacement in India.* Great Britain: MacMillan Press LTD.

Parkes, M., K. Morrison, M. Bunch, L. Hallström, R. Neudoerffer, H. Venema, and D. Waltner-Toews. 2010. Towards integrated governance for water, health and social-ecological systems: The watershed governance prism. *Global Environmental Change* 20(4): 693-704.

Patton, M. Q. 1990. *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Phadke, R. Water works in India. *Journal of Political Ecology* 20: 80-97.

Piattoni, S. 2010. *The Theory of Multi-level Governance: conceptual, empirical, and normative challenges.* Oxford University Press: New York, New York.

Planning Commission. 2012. "Twelfth Five Year Plan 2012-2017," Government of India. http://planningcommission.gov.in/plans/planrel/12thplan/welcome.html

Plummer, R., D.R. Armitage, and R.C. de Loë. 2013. Adaptive Comanagement and Its Relationship to Environmental Governance. *Ecology and Society* 18(1): 21.

Pollard, S. and D. du Toit. 2011. Towards adaptive integrated water resources management in southern Africa: The role of self-organisation and multi-scale feedbacks for learning and responsiveness in the Letaba and Crocodile catchments. *Water Resources Management* 25(15): 4019-4035.

Prakash, A. 2014. The periurban water security problem: a case study of Hyderabad in South India. *Water Policy* 16(3): 454-469.

Prathapar, S.A., M. ul Hassan, Z. Mirza, and Z. Tahir. 2001. Constraints on Enforcement of Water Policies: Selected Cases from South Asia. In: Brennan, D. (Ed.) *Water Policy Reform: Lessons from Asia and Australia*. Proceedings of an International workshop held in Bangkok, Thailand, 8–9 June 2001. ACIAR Proceedings No 106: 171-176.

Programme Evaluation Organisation (PEO). 2010. Evaluation Study on Rajiv Gandhi National Drinking Water Mission (RGNDWM). Planning Commission, Government of India. November 2010.

Prokopy, L. 2005. The relationships between participation and project outcomes: evidence from rural water supply projects in India. *World Development* 33(11): 1801-1819.

Province of Nova Scotia. 2012. Environmental Goals and Sustainable Prosperity Act Progress Report 2012. https://www.novascotia.ca/nse/egspa/docs/EGSPA.2012.Annual.Report.pdf

Ranganathan, M. 2014. 'Mafias' in the Waterscape: Urban Informality and Everyday Public Authority in Bangalore. *Water Alternatives* 7(1): 89-105.

Rathwell, K.J., D. Armitage, and F. Berkes. 2015. Bridging knowledge systems to enhance governance of environmental commons: a typology of settings. *The Commons Journal* 9(2): 851-80.

Raven, J. 2000. The Raven's Progressive Matrices: Change and stability over culture and time. *Cognitive Psychology* 41(1): 1-48.

Ray, I. 2007. Women, Water, and Development. *Annual Review of Environment and Resources* 32(1): 421-449.

Reckien, D., F. Creutzig, B. Fernandez, S. Lwasa, M. Tovar-Restrepo, D. Mcevoy and D. Satterthwaite. 2017. Climate change, equity and the Sustainable Development Goals: an urban perspective. *Environment & Urbanization* 29(1): 159-182.

Redman, C., M.J. Grove, and L. Kuby. 2004. Integrating Social Science into the Long Term Ecological Research (LTER) Network: Social Dimensions of Ecological Change and Ecological Dimensions of Social Change. *Ecosystems* 7(2): 161-171.

Reed, M. and K. McIlveen. 2006. Toward a Pluralistic Civic Science?: Assessing Community Forestry. *Society & Natural Resources* 19(7): 591-607.

Renouf, M. and S. Kenway. 2016. Evaluation Approaches for Advancing Urban Water Goals. *Journal of Industrial Ecology* 21(4): 995-1009.

Richards, A. and N. Singh. 2002. Inter-state Water Disputes in India: Institutions and Policies. *International Journal of Water Resources Development* 18(4): 611-625.

Rogers, P. and A.W. Hall. 2003. Effective Water Governance - TEC Background Paper No. 7. *Global Water Partnership.* Elanders Novum: Sweden http://hdl.handle.net/10535/4995

Rossman, G.B. and B.L. Wilson. 1985. Numbers and words: Combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review,* 9(5): 627-643.

Runhaar H. and P. Driessen. 2007. What makes strategic environmental assessment successful environmental assessment? The role of context in the contribution of SEA to decision-making, *Impact Assessment and Project Appraisal* 25(1): 2-14.

Sadashivaiah, C., C.R. Ramakrishnaiah, and G. Ranganna. 2008. Hydrochemical Analysis and Evaluation of Groundwater Quality in Tumkur Taluk, Karnataka State, India. *International Journal of Environmental Res. Public Health* 5(3): 158-164.

Sahu, S. 2016. Sustainable Urban Water Supply in India: Some Issues of Governance. *Journal of Governance & Public Policy*, 6(2): 105-111.

Saleth, R.M. 2004. *Strategic analysis of water institutions in India: Application of a new research paradigm.* Research Report 79. Colombo, Sri Lanka: International Water Management Institute.

Scarlett, L. 2012. Managing Water: Governance Innovations to Enhance Coordination. *Issue Brief: Resources for the Future.* May 2012, Issue Brief 12-04.

Schmidt, J.J. and D. Shrubsole. 2013. Modern water ethics: Implications for shared governance. *Environmental Values* 22(3): 359-379

Shaban, A. and S. Sattar. 2011. Water security and sustainability in urban India. *International Journal of Global Environmental Issues* 11(3/4): 231-254.

Shah, T. and B. van Koppen. 2006. Is India Ripe for Integrated Water Resources Management? Fitting Water Policy to National Development Context. *Economic and Political Weekly* 41(31): 3413-3421.

Shah, M. 2013. Water: towards a paradigm shift in the twelfth plan. *Economic & Political Weekly*

67(3) (19 January 2013), 40–52.

Shah, T. and B. van Koppen. 2016. The Precept and Practice of IWRM in India. In: Narian, V. and A. Narayanamoorthy (Eds). *Indian Water Policy at the Crossroads: Resources, Technology and Reforms. Global Issues in Water Policy.* Springer: 15-33.

Singh, C., R. Basu, and A. Srinivas. 2016. Livelihood vulnerability and adaptation in Kolar District, Karnataka, India: Mapping risks and responses. *Indian Institute for Human Settlements*. Adaptation at Scale in Semi-Arid Regions.

Singh, N. 2006. Women's Participation in Local Water Governance: Understanding Institutional Contradictions. *Gender, Technology and Development* 10(1): 61-76.

Smit, B., O. Pilifosova, I. Burton, B. Challenger, S. Huq, R.J.T. Klein, G. Yohe, N. Adger, T. Downing, E. Harvey, S. Kane, M. Parry, M. Skinner, and J. Smith. 2001. Adaptation to climate change in the context of sustainable development and equity, In: *Climate Change 2001: Impacts, Adaptation, and Vulnerability*. p877-912.

Smith, B. and M. Zeder. 2013. The onset of the Anthropocene. *Anthropocene,* 4: 8-13.

Spaiser, V., S. Ranganathan, R.B. Swain, and D.J.T. Sumpter. 2017. The sustainable development oxymoron: quantifying and modelling the incompatibility of sustainable development goals. *International Journal of Sustainable Development & World Ecology* 24(6): 457-470

Srivastava, S. 2012. Swajaldhara: 'Reversed' Realities in Rural Water Supply in India. *IDS Bulletin* 43(2): 37-43.

Srivastava, S. and M. Rajadhyaksha. 2016. Can organisation development principles in India's local governments improve governance? *Commonwealth Journal of Local Governance* 19: 5450.

Stake, R. 1995. *The art of case study research.* Thousand Oaks: Sage.

Therien, J. 1999. Beyond the North-South divide: The two tales of world poverty. *Third World Quarterly* 20(4): 723-742.

Tuhimai Smith, L. 1999. *Decolonizing Methodologies: Research and Indigenous Peoples.* London: Zed Books.

Tropp, H. 2007. Water governance: trends and needs for new capacity development. *Water Policy* 9(S2): 19-30.

Tumushabe, J.T. 2017. Climate change, food security and sustainable development in Africa. In:

Oloruntoba S., Falola T. (Eds.) The Palgrave Handbook of African Politics, Governance and Development. Palgrave Macmillan, New York

United Nations. 1972. *Declaration of the United Nations Conference on the Human Environment: The Stockholm Declaration*. Stockholm: UNEP. http://www.unep.org/documents.multilingual/default.asp?documentid=97&articleid=1503

United Nations. 1987. *Our Common Future: The Brundtland Report.* Oxford University Press, New York.

United Nations. 2015a. *The Millennium Development Goals Report.* Report of the UN. New York: United Nations.

United Nations. 2015b. Transforming Our World: The 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

United Nations. 2015c. "SDG 6 - Interlinkages," http://www.unwater.org/fileadmin/user_upload/unwater_new/docs/SDG6-Interlinkages%201and2.pdf

United Nations Development Programme (UNDP). 1997. Governance for Sustainable Human Development. UNDP Policy Document. http://pogar.org/publications/other/undp/governance/undppolicydoc97-e.pdf

United Nations International Children's Emergency Fund (UNICEF). 2006. *The State of the World's Children 2007: Women and Children – the Double Dividend of Gender Equality.* Report from UNICEF. New York: UNICEF House.

UNICEF and World Health Organization (WHO). 2015. Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment. WHO Press: Geneva, Switzerland.

UNICEF, Food and Agriculture Organization of the United Nations (FAO), & The South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERs). 2013. Water in India: Situation and Prospects. UNICEF, FAO & SaciWATERs. Delhi. See: http://www.unicef.org/india/media_8098.htm

United Nations Regional Information Centre (UNRIC). 2015. Making water a human right. Accessed at: http://www.unric.org/en/water/27360-making-water-a-human-right

UN-Water and WHO. 2016. "Integrated Monitoring of SDG 6: Status of the Global Monitoring

Framework. 7th Meeting of the OECD Water Governance Initiative." Presented by Frederico Properzi (UN-Water) and Marina Takane (WHO) at The Hague: 23 June 2016.

United Nations World Water Assessment Programme (WWAP). 2015. *The United Nations World Water Development Report 2015: Water for a Sustainable World.* Paris: UNESCO

Vaid, R. 2014. Caste in Contemporary India: Flexibility and Persistence. *Annual Review of Sociology* 40(1): 391-410.

Vandemoortele, J. 2009. The MDG Conundrum: Meeting the Targets Without Missing the Point. *Development Policy Review* 27(4): 355-71.

Vandemoortele, J. 2011. The MDG Story: Intention Denied. *Development and Change* 42(1): 1-21.

Wallis, P., R. Ison and K. Samson. 2013. Identifying the conditions for social learning in water governance in regional Australia. *Land Use Policy* 31(1): 412-421.

Watson, N. 2007. Collaborative Capital: A Key to the Successful Practice of Integrated Water Resources Management. In: Warner, J. (ed.) *Multi-stakeholder Platforms for Integrated Water Management.* England: Ashgate Publishing.

Weiss, T. 2009. Moving Beyond North-South Theatre. *Third World Quarterly* 30(2): 271-284.

Woodbine Ecology Center. 2016. "Indigenous Values," Promoting Indigenous Values & Sustainable Communities. Accessed on 10th April, 2016 at http://www.woodbinecenter.org/indigenous-values

Woodhouse, P. and M. Muller. 2017. Water Governance – An Historical Perspective on Current Debates. *World Development* 92(1): 225-241.

World Bank. 2015. Republic of India: Support to Drinking Water Security Pilots in India. Report No. AcS13318. May 12, 2015. http://documents.worldbank.org/curated/en/644021468250793003/pdf/Output-P131954-2015-05-12-03-10.pdf

World Commission on Environment and Development (WCED). 1987. *Our Common Future* or "The Brundtland Report." New York: Oxford University Press.

World Health Organization (WHO). 2004. Information Products: Water, Sanitation and Health. *Catalogue Water Sanitation and Health.* Switzerland, Geneva: WHO.

WHO and UNICEF. 2005. Water for life: Making it happen. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. France: WHO Press.

WHO and UNICEF. 2014. Progress on Drinking Water and Sanitation: 2014 Update. Report from the Joint Water Supply and Sanitation Monitoring Programme.

World Water Council (WWC). 2016. "About Us". Accessed on 10th April, 2016. http://www.worldwatercouncil.org/about-us/vision-mission-strategy/

Wuebbles, D.J. and A.K. Jain. 2001. Concerns about climate change and the role of fossil fuel use. *Fuel Processing Technology* 71(1-3): 99-119.

Yin, R. 2009. *Case study research: Design and method* (4th ed.). Thousand Oaks, CA: Sage.

Young, O. 2008. Building regimes for socioecological systems: institutional diagnostics. In: Young, O., King, L., Schroeder, H. (Eds). *Institutions and Environmental Change*. MIT Press, Cambridge: 115–144.

Zwarteveen, M. 2008. Men, Masculinities, and Water Powers in Irrigation. *Water Alternatives* 1: 111-130.

Appendix A: United Nations. 2015c. “SDG 6 – Interlinkages”


ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL
A STRONG, INTEGRATED WATER AND SANITATION GOAL SHOULD HAVE INTERCONNECTING, MUTUALLY REINFORCING TARGETS - WHICH LINK TO ALL OTHER AREAS OF SUSTAINABLE DEVELOPMENT.
SUCCESSFUL REALISATION OF GOAL 6 WILL UNDERPIN PROGRESS ACROSS MANY OF THE OTHER GOALS AND TARGETS.
GOAL 6
WATER & SANITATION
THE KEY TO A SUSTAINABLE FUTURE
6.1 SAFE DRINKING WATER
1 in 10 of the population has no access to clean water. This means a child dies from a water borne disease every 15 seconds. The burden for gathering drinking water falls largely on women and girls, who spend a back-breaking 200 million hours every day collecting it. This is time that could be spent in school or gainful employment.
LINKED GOALS: END POVERTY (1.4) END HUNGER (2.2) HEALTHY LIVES (3.2, 3.3, 3.8) QUALITY EDUCATION (4.1, 4.5) GENDER EQUALITY (5.4) REDUCE INEQUALITY (10.3) SUSTAINABLE CITIES (11.1)
6.2 SANITATION AND HYGIENE
Over 1/3 of the global population are still without access to an improved sanitation facility. More than 1 billion defecate in the open. Millions lack vital handwashing with soap or menstrual hygiene facilities. Diarrhoeal disease, largely caused by poor water, sanitation and hygiene, is a leading cause of malnutrition, stunting and child mortality. Inadequate facilities also affect education and economic productivity and impact the dignity and personal safety of women and girls.
LINKED GOALS: END POVERTY (1.4) END HUNGER (2.2) HEALTHY LIVES (3.2, 3.3, 3.8) QUALITY EDUCATION (4A, 4.1, 4.5) GENDER EQUALITY (5.2) REDUCE INEQUALITY (10.3) SUSTAINABLE CITIES (11.1) SUSTAINABLE GROWTH (8.9)
6.3 WATER QUALITY
Research suggests only 20% of global wastewater is currently being treated. The rest gets dumped untreated into water supplies – rivers, lakes and oceans. If wastewater is drunk – as happens in many water-stressed cities – or used directly in agriculture, the impacts for human health, ecosystems, biodiversity and agriculture can be considerable.
LINKED GOALS: HEALTHY LIVES (3.3, 3.9) RESILIENT INFRASTRUCTURE (9.4) SUSTAINABLE CITIES (11.6) SUSTAINABLE CONSUMPTION (12.4) SUSTAINABLE OCEANS (14.1) SUSTAINABLE ECOSYSTEMS (15.1)
6.4 WATER EFFICIENCY
Successfully balancing interrelated global demands for water, energy and food will be central to realising sustainable development. Agriculture currently uses 70% of freshwater supplies – and the need for water will only grow as demand for food and energy is expected to rise by 50% and 35% respectively by 2030. Water efficient innovations and practices must be rolled out across all sectors to help meet growing need without degrading ecosystems.
LINKED GOALS: END POVERTY (1.4, 1.5) END HUNGER (2.4) QUALITY EDUCATION (4.7) ACCESS TO ENERGY (7.1, 7.2) RESILIENT INFRASTRUCTURE (9.4, 9A) SUSTAINABLE CONSUMPTION (12.2) SUSTAINABLE ECOSYSTEMS (15.1)
6.5 WATER RESOURCES MANAGEMENT
2/3rds of the world's population could face water stress by 2025 – with the potential to fuel social, economic and environmental tensions within and between countries. The impact of climate change – droughts, floods and ecosystem degradation – will only serve to exacerbate resource-related unrest.
LINKED GOALS: RESILIENT INFRASTRUCTURE (9.1, 9.4) SUSTAINABLE CITIES (11A, 11B, 11.5) SUSTAINABLE CONSUMPTION (12.2) INCLUSIVE SOCIETIES (16.1, 16B) GLOBAL PARTNERSHIP (17.6, 17.7, 17.9)
6.6 WATER-RELATED ECOSYSTEMS
Water-related ecosystems – such as wetlands and mountains – underpin most of the Earth's natural processes. But water stress is depleting aquifers, reducing river flows and degrading wildlife habitats. Unless urgently addressed, this will have devastating economic, ecological and human consequences.
LINKED GOALS: RESILIENT INFRASTRUCTURE (9.4) SUSTAINABLE CITIES (11.5) SUSTAINABLE CONSUMPTION (12.2, 12.4, 12.8) CLIMATE CHANGE (13.3) SUSTAINABLE OCEANS (14.1) SUSTAINABLE ECOSYSTEMS (15.1, 15.3, 15.8, 15.9)
KEY: LINKED GOALS
END POVERTY (SDG 1)
END HUNGER (SDG 2)
HEALTHY LIVES (SDG 3)
QUALITY EDUCATION (SDG 4)
GENDER EQUALITY (SDG 5)
SUSTAINABLE WATER & SANITATION (SDG 6)
ACCESS TO ENERGY (SDG 7)
SUSTAINABLE GROWTH (SDG 8)
RESILIENT INFRASTRUCTURE (SDG 9)
REDUCE INEQUALITY (SDG 10)
SUSTAINABLE CITIES (SDG 11)
SUSTAINABLE CONSUMPTION (SDG 12)
CLIMATE CHANGE (SDG 13)
SUSTAINABLE OCEANS (SDG 14)
SUSTAINABLE ECOSYSTEMS (SDG 15)
INCLUSIVE SOCIETIES (SDG 16)
GLOBAL PARTNERSHIP (SDG 17)
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Appendix B: Recruitment Script

UNIVERSITY OF WATERLOO

25th July, 2016

To Whom It May Concern:

My name is Danielle Lindamood and I am a master's student in Canada doing a thesis at the University of Waterloo in Ontario, Canada in the School of Environment, Enterprise and Development. I work under the supervision of Professor Prateep Nayak. This master's thesis focuses on the way decisions are made about water, or water governance. More specifically, I want to know how and why procedures and decisions help or hinder the achievement of Sustainable Development Goal #6 (SDG6) – 'universal access to clean water and sanitation.' I want to also better understand social and ecological circumstances in Bangalore and more broadly in India as they relate to water governance. Because you are a person who works in or is affected by water governance, your opinions are important to this study. I would appreciate the opportunity to speak with you about this topic, and I hope to give back to communities through participatory activities that may help them see what facilitates or hinders success in SDG 6-related projects. I hope that this research enables participants to share their knowledge about water governance in India and helps contribute to improving the achievability of SDG6.

Participation in this study is voluntary and would potentially entail involvement in one or both of two research activities 1) 30-60 minute individual interview; and/or 2) 45-60 minute focus group which will involve some group discussion and group activities such as making resource maps, social maps, activity profiles, and Venn Diagrams (explain activities if clarity is needed). Some anticipated risks might include: 1) emotional, since I will be asking you about your experiences with water governance (for example, "How have the decisions made about water impacted your life?"); 2) social risk, as people may not agree and activities may discuss social hierarchies; and 3) economic risk, since you may end up being away from work during the interview or focus group. To mitigate some of these risks, we will encourage you to openly indicate discomfort and to express any concerns that you may have at any time. Further, we will ensure that your responses remain confidential. All information you provide will be grouped with responses from other participants - although, the information shared during the focus group would be known to other participants of the focus group.

With your permission, I would like to record your responses and our sessions using a voice recorder. However, you may choose to assume an alternate identity during these recordings, meaning that I can refer to you by a different name. You may decline to participate in any activity that you do not feel comfortable doing, you may decline to be recorded, and you may decline in answering any questions you feel you do not wish to answer. Digital audio recordings will be stored on a password protected computer and

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deleted after a period of five years. Other data collected through this study will be kept in a locked cabinet in my supervisor's office, or stored on a password protected computer for at least five years. With your permission, this data will be stored for more than five years but where permission is not given, it will be destroyed. All of the data collected from this study will be deidentified (meaning your personal attributes will be removed) and anonymized with a coded number to protect your identity. Once all the data is collected and analyzed for this project, I plan on sharing this information with ATREE and the research community through seminars, conferences, presentations, and journal articles. You will not be identified by name in my thesis or in any report or publication resulting from this study, neither will any of the names that you provide during our discussions.

If you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Nayak at pnayak@uwaterloo.ca or at 1-519-888-4567, Ext. 33112. My contact information has also been provided below. If you do not have access to a phone for long-distance calls, or if you require translation, we can arrange for both. Information in Kannada may be sought from Mr. Manjunatha Sonu at +91 77601 39199. Collect calls will be accepted as well.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Should you have comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin in the Office of Research Ethics, at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca. Once again, collect calls will be accepted and a translator employed as necessary.

Thank you for taking the time to speak with me, and for your assistance with this project, I truly appreciate it.

Yours sincerely,

Danielle Lindamood
University of Waterloo
School of Environment, Enterprise and Development
Phone number / WhatsApp: +1 (760) 626-8664
E-mail: dlindamo@uwaterloo.ca

Appendix C: Interview Guide – Community Participants

Interview Guide – Community participant

How did you or your household access water in your village before the central government projects?

What kind of project(s) or infrastructure was built? (i.e. hand pump, piped water, borewell, etc.)

How was it chosen what kind of project should be built? (hand pump, piped water, borewell, etc.)

Who do you think had the most influence during the process of the central government projects being built? (a person or organization or gov. office, etc.)

How was the location chosen in the village for where the project should be built?

What do you use the water for? (drinking, domestic use, agriculture, etc.)

Does any particular group, household, or individual benefit more from the project? Does anyone benefit less? (i.e. castes, class, the rich, the poor, etc.)

What are the main benefits of these project for you (or your household or village)? What are some of the negative impacts, if any, of these projects?

When central government projects are built, do you learn anything about water resources? If so, what?

Has your understanding of the ways humans and water interact changed at all since these projects were built?

Overall, do you see these central government projects as a success for bringing safe drinking water? Why or why not?

Do you see any challenges to be overcome for the central government projects? If not, why? If so, how can these challenges be overcome?

Is there anything else you would like to tell me or think I should know about the central government projects in Thirumagondanahalli?

Do you have any recommendations of others who may be good to talk to about my questions?

Appendix D: Interview Guide – non-community participants

Interview Guide – Non-community participants

1. In general, what is your connection to water governance in India?

2. Considering both public and private efforts to meet water needs, who are these different water projects and schemes meant to help or support?

3. How are villages or communities identified to receive funds or projects from these different efforts?

4. How are community members involved in water project or governance processes?

5. How are marginalized groups taken into account in the efforts to meet water needs in India? (i.e. women, certain castes, elderly)?

6. Who are the key agencies / groups / institutions involved in water governance at different levels?

7. Among the different groups and people involved, who do you think has the most influence or power?

8. What are the key facets of the water governance arrangement in India?

9. In your opinion, what are the key principles of successful water governance?

    a. Is it the same for public vs. private efforts?
    b. Is it the same for the Indian context vs. other countries?

10. What challenges do you see to be overcome in the way water is governed in India? **How** can these challenges be overcome [or how have they been overcome]?

11. How do you see international initiatives being considered or incorporated into the public and private efforts to meet water needs? (for example the SDG 6 on sustainable access to drinking water and sanitation, but also the interconnections in SES from the UN)

12. Do you think the projects to meet water needs in India affect how people relate to their environment? Why or why not?

13. Do you think the different water governance arrangements in India consider long-term positive and negative impacts on the environment?

14. Is there anything else you would like to tell me or think I should know about the national government water schemes or more generally, water governance in India?

Appendix E: Categories summary table from Cronin et al (2014)

Table 2. Comparison of the key recommendations from UNICEF *et al.* (2013), Shah (2013) and ADB (2013).

Broad category	UNICEF *et al.* (2013)	Shah (2013)	ADB (2013)
Water resources (overall responsibility: MoWR)	• New indices are needed to reflect available water resources and take disparity in water allocation and access into account • Water demand is far exceeding supply and leading to inter-sectoral conflicts	• Watershed restoration and groundwater recharge strengthening • Large irrigation reform needed • Breaking the groundwater–energy nexus • Conjoint water and wastewater management in urban India • Reduce/reuse industrial water with water audits and regulation	• Start managing groundwater as a valuable and limited resource • Revitalize irrigation institutions for transformation of irrigation services • Optimize already developed water resources by investing in and incentivizing 'reduce, reuse, recycle' systems • Embrace the challenge of the water–food–energy nexus • Make integrated water resources management a priority • Mobilize additional resources to clean up rivers
Drinking water and sanitation for health (overall responsibility: MDWS, MoUD)	• The time bomb of increasing water pollution is ticking	• New approach to rural drinking water and sanitation required; must be demand driven and participatory	• Need to invest in better sanitation
Data and knowledge (overall responsibility: MoWR, MDWS and MoUD)	• To achieve any headway in gender-sensitive policies, data disaggregation is urgently required	• Development of a water database development and management	
Policy, institutions and capacity (overall responsibility: Planning Commission and oversight mechanism)	• Reorientation and capacity building required for technocrats for a new vision for water management	• New Institutional and Legal Framework, (Ground water law, National Water Framework Law) • Participatory Aquifer Management	• Corporatization of water utilities • New problems demand institutions crafted for current challenges
Disaster preparedness (overall responsibility: NDMA working with line Ministries)		• Renewed focus on non-structural mechanisms for flood management	• Forewarned is forearmed: implementing integrated structural and nonstructural approaches to disaster risk management improves preparedness • Create insurance mechanisms to minimize reliance on disaster relief

Sources: Authors' compilation; Ministry of Water Resources (MoWR), Ministry of Drinking Water and Sanitation (MDWS), Ministry of Urban Development (MoUD), National Disaster Management Agency (NDMA).

Appendix F: Thematic Areas Table for Micro Level

Micro-level Perspectives		
Enabling Factors	**Hindering Factors**	**Thematic Areas**
Proper maintenance	Electricity dependent access	**Practical Considerations**
River interlinking for surface water*	Local water resources	
RO systems for better quality	Nature & climate change	
Teamwork	O&M lays outside community capacities	
	Source sustainability of groundwater	
	Time (criticality of present needs)	
Citizen pressure	Egos of stakeholders	**Power Relations**
Communication between community members	Political cycles / agendas	
Listening to community voices	Private ownerships of bore wells and land	
	Unresponsive people in upper Panchayats	
	Voices of the poor are not valued	
Awareness of issues and schemes		**Knowledge & Capacity Building**
Education		
Knowledge in general		
Quality individuals (intentions and capacities)		
Trainings on water resources		
Accountability (citizens, panchayat members)	Changing climatic patterns	**Policy Design**
Community participation	Quality assurance	
Considering future generations / situations	Tariffing of water	
Context specific solutions		
Proper maintenance		
Sufficient funding		
Vision (shared)		
Water conservation		
Community involvement in decision-making	Acting on policies (follow through)	**Institutional Design**
NGO involvement	Lack of clarity in funding sources	
Use of Gram Sabhas	Political cycles	
Village Water and Sanitation Committees	Slow bureaucratic processes	
	Slow response of institutions	

Appendix G: Thematic Areas for Meso Level

Meso-level Perspectives		
Enabling Factors	**Hindering Factors**	**Thematic Areas**
Absorption capacity		**Practical Considerations**
Diversifying sources	Caste system / class differences	
Flexibility in implementation	Gap between intention and reality	
Program & policy design	Implementation in reality	
	Nature & climate change	
	Time (criticality of present needs)	
Community participation		**Power Relations**
Relationships / Trust		
Community mobilizers	Influence of businesses, economic motivations	
International pressure	Political cycles / agendas	
Involvement of community in decision-making	Poverty / literacy rates	
Leadership / Facilitation		
Capacity building	Lack of space to care	**Knowledge & Capacity Building**
Considering human-environment connection	Poor capacities of individuals	
Education		
Ground-level feedback to the top		
Quality individuals (intentions & capacities)		
Trainings		
Water planning with communities (safety and security)		
Vision (shared)		**Policy Design**
Scaling		
Context-specific solutions	Changing foci (political cycles, agendas, doing what's sexy)	
Decentralized approach	Indicators	
Flexibility	Tariffing of water / willingness to pay	
Good monitoring		
Knowledge-responsive, science-driven policy		
Problem recognition and understanding		

Ensuring equity		**Institutional Design**
Funding (continuity, sustainability, mobilization, accountability		
Accountability	Access to information	
Community involvement	Development changes	
Coordinated approach amongst the different managing departments	Responsibility levels on PDOs	
'Good' NGO involvement		
Public-private partnerships		

Appendix H: Thematic Areas for Macro Level

Macro-level Perspectives		
Enabling Factors	**Hindering Factors**	**Thematic Areas**
Leadership / facilitation	Caste system / class differences	**Practical Considerations**
	High turnover rates in bureaucracy	
	Implementation in reality	
	Red tape	
	Scaling of projects	
	Source dependency on groundwater	
	Time (criticality of present needs)	
Community participation		**Power Relations**
Relationships / trust		
International pressure	Corruption	
Involvement of community in decision-making	Influence of businesses, economic motivations	
	Political cycles / agendas	
	Poverty / literacy rates	
Education / awareness levels		**Knowledge & Capacity Building**
Capacity building	Dramatization of problems (media, politics, responsiveness to it)	
Education	Lack of space to care	
Quality individuals (intentions & capacities)	Poor capacities of individuals	
Trainings		
Water planning with communities (safety and security)		
Ensuring equity		**Policy Design**
Vision (shared)		
Accountability	Blanket policies	

Context-specific solutions	Changing foci (political cycles, agendas, doing what's sexy)	
Decentralized approach	'Firefighting' against urgent day-to-day issues	
Flexibility	Funding	
Good monitoring	Gap between policy intentions and implementation	
Knowledge-responsive, science-driven policy	Indicators	
Problem recognition and understanding	Reactive or retrospective policies & decision-making	
	Tariffing of water / willingness to pay	
Communication between departments		**Institutional Design**
Concurrent system		
Ensuring equity		
Funding (continuity, sustainability, mobilization, accountability)		
Accountability	Access to information	
Community involvement	Development changes	
Coordinated approach amongst the different managing departments	Lack of oversight	
Coordination / concerted action	Political cycles	
'Good' NGO involvement	Responsibility levels on PDOs	
Public-private partnership		
Sharing of power, oversight, authority		
Transparency		