Good drinking water and sanitation governance? The case of Ghana

Master Thesis in Sustainable Development
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Key concepts:	*access to sanitation, access to drinking water, water governance, Ghana, Netherlands*
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Preface

My interest in water governance came about a few years ago, thinking about how lacking infrastructure that we take for granted in Europe is cause of so much suffering in other parts of the world, especially in the Sub-Saharan region. Drinking water, and basic sanitation, both of which we know to be a basic need for us to live and be healthy, the lack of which causing survival rates, expected age and health standards to plummet. Yet, even today, access to drinking water and basic sanitation is a goal to work towards to in many parts of the world. As such, I was interested to look into the governance aspects of providing sustainable access to safe drinking water and basic sanitation, and what exactly that entails, and how to measure it.

Fortunately, last year, I had the opportunity to spend a few months in Ghana. Incidentally, Ghana is also a country that is still working towards achieving full coverage of sustainable access to safe drinking water and basic sanitation. As such, discovering details about the above aspect of water governance in Ghana specifically, and aiming to define the strengths and weaknesses of Ghana's water governance system seemed like the perfect focus for my master thesis.

Naturally, plans do not play out as they are imagined, as such, the biggest obstacle in my research was that the original idea to support my literature-based research with interviews from experts on the field could not be achieved as my interview subjects were not available. As a solution, I re-focused my research, and took the well-functioning water governance structure of the Netherlands as a benchmark to measure my focus country, Ghana, against it. As a result, the below master thesis has reached its objective, by exploring the concepts of good water governance in relation to sustainable access to safe drinking water and basic sanitation, as well as identifying the strengths and weaknesses of the same in Ghana, using the Dutch water governance as a benchmark.

At the end of the nine months that I spent with writing this master thesis, I would like to thank everyone who supported me along the way. First, and foremost, my thesis supervisor, Carel Dieperink, who guided me in the process, challenged me and gave me feedback on the many, many versions of my work. Also, Frank van Laerhoven, my second reader, who gave very insightful and useful comments on my research proposal that I could use for my thesis work. A special thank you for Helena Gluzman, who took time to help out an old friend and edited my never-ending English sentences into a more readable prose. Finally, I would also like to thank the on-going support of my family and friends, who stood by me and lifted my spirits when I needed it most.

Abstract

Key concepts: Access to sanitation, access to drinking water, water governance, Ghana, Netherlands.

The global sustainable development goals (SDG), as recently updated by the UN, still include: “Goal 6. Ensure access to water and sanitation for all. The issue of access to water and sanitation is the most prevalent in Africa. This study focuses on Ghana, a country in Africa. Further, the research looks at water governance and management aspects of this SDG.

The objective of this research is to assess the current structures around sustainable access to safe drinking water and basic sanitation in the focus country of Ghana, where there are outstanding issues in this area, in order to come up with which aspects of water governance to focus on and possibly recommendations to solve the discovered issues. In order to evaluate the water governance in Ghana, in this study, the water governance of the Netherlands was used as a benchmark to answer the following research question:

What are the strengths and weaknesses of Ghana’s water governance in terms of sustainable access to safe drinking water and basic sanitation when comparing to the industry best practice that is represented by the Dutch water governance?

I aim to assess the Ghanaian water governance and management practices, using the ten building blocks approach by van Rijswick et al (2014) as assessment framework, This approach provides the following building blocks of water governance to consider: (1) water system knowledge; (2) values, principles, policy discourses; (3) stakeholders involvement; (4) trade-offs between social objectives; (5) responsibility, authority, means; (6) regulations and agreements; (7) financial arrangements; (8) engineering and monitoring; (9) enforcement and (10) conflict prevention and resolution.

By conducting a literature review the relevant assessment criteria is developed based on scientific literature and based on that, a methodology of assessment (Chapter 2 & 3). Next, it will provide an overview of the Dutch situation, looking at the Netherlands as a good governance benchmark (Chapter 4). After customizing the assessment framework to the issue at hand, and setting the benchmark against which to measure, further in-depth insight to the practical issues in relation to each of the building blocks in Ghana was attempted (Chapter 5). Further, after comparison of the available data of the two countries (Chapter 6) the following findings are made. First, that the major strengths of the Ghanaian system include the presence of democracy, of both government and market actors, the set-up of the design and implementation as well as the existence of the environmental monitoring system. Second, the major weakness is in the lack of available data. Recommendations are arrived at based on the findings as to how to improve water governance practices regarding sustainable access to safe drinking water and basic sanitation in Ghana (Chapter 7). These recommendations include first and foremost that the availability of the water systems knowledge is needed to improve water governance in Ghana, together with transparent rules, and sufficient financial funding.

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List of Abbreviations

Abbreviation	**Full expression**
ADR	Alternative Dispute Resolution Process
AM	Adaptive Management
CIDA	Canadian International Development Agency
CONIWAS	Ghana Coalition of NGOs in the Water & Sanitation Sector
CWSA	Community Water and Sanitation Agency (Ghana)
DGRW	Directorate-General for Spatial Development and Water Affairs
DGRW	Directorate-General for Spatial Development and Water Affairs (Dutch)
EC	European Commission
ECHR	European Convention of Human Rights
EPA	Environmental Protection Agency (Ghana)
EU	European Union
GDP	Gross Domestic Product
GW	Grondwet (Dutch Constitution)
GWCL	Ghana Water Company Limited
GWSC	Ghana Water and Sewerage Corporation
HAP	Hydrogeological Assessment of the Norther Region of Ghana Project
ILT	Human Environment and Transport Inspectorate (Dutch)
IWRM	Integrated Water Resources Management
JMP	Joint Monitoring Programme
KNMI	The Royal Netherlands Meteorological Institute (Dutch)
LNGO	Local Non-Governmental Organization
MDGs	Millennium Development Goals
MIRT	Multi-Year Investment Programme (Dutch)
MTF	Management and Transition Framework

NAI	Dutch Arbitration Institute
NAI	Dutch Arbitration Institute
NGO	Non-governmental Organization
NWP	National Water Plan (Dutch)
OECD	Organization for Economic Co-operation and Development
PURC	Public Utilities Regulatory Commission
RWA	Regional Water Authority
RWS	Rijkswaterstaat (Public Works and Water Management)
SDGs	Sustainable Development Goals
SLA	Service Level Agreement
TEU	Treaty of the European Union (European Union, 2008)
UN	United Nations
UNESCAP	UN Economic and Social Commission for Asia and the Pacific (UN ESCAP, 2010)
UNESCO	UN Educational Scientific and Cultural Organization
VAT	Value added tax
WB	World Bank
WFD	(European Commission, 2000)
WHO	World Health Organization
WRC	Water Resources Commission (Ghana)

1 Introduction

1.1 The global challenge

Access to water is a global issue, from the Brundtland report (World Commission on Environment and Development, 1987) where it concerned itself with the aspect of food security and in relation to that, sustainable access to safe drinking water, one of the UN's Millennium Development Goals was to "*halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation*" (United Nations, 2014). The recent conference in New York, where the Sustainable Development Goals (SDGs) were formed, as a follow-up to the earlier MDGs, it still includes a similar goal, thus considering the access to water and basic sanitation as an issue still (Sachs, 2012; United Nations, 2015b; United Nations General Assembly, 2015; WHO, 2014).

According to the latest report, the earlier MDG was achieved, before schedule, by 2010 (United Nations, 2014). However, in a number of developing countries there are still enormous lags in achieving this goal (UN Water, 2015; World Health Organization, 2014). Although a number of actors are involved in searching for the solution to this crisis, the problem still remains. "*Water—or the lack of it—is one of the biggest issues facing urban Africa, which will see a 66 percent population increase to 1.2 billion people by 2050*" (Dzawu, 2013).

The focus on Ghana, within Africa, is substantiated with the idea that the availability of acceptable sanitation in that country is rather low: *"(m)ore than 80 percent of people in Ghana have access to safe water, but only 13 percent of people have access to improved sanitation*" (Water.org, 2015). Further, the UN and WHO simultaneously began work on this issue since 2003, (United Nations General Assembly, 2004) and yet there seem to be rather significant gaps still.

For the purposes of this research, the definition of *access to safe drinking water* follows the WHO definition, i.e.:

- "Drinking water is water used for domestic purposes, drinking, cooking and personal hygiene;
- ***Access*** to drinking water means that the source is less than 1 kilometre away from its place of use and that it is possible to reliably obtain at least 20 litres per member of a household per day;
- ***Safe drinking water*** is water with microbial, chemical and physical characteristics that meet WHO guidelines or national standards on drinking water quality;
- Access to safe drinking water is the proportion of people using improved drinking water sources: household connection; public standpipe; borehole; protected dug well; protected spring; rainwater." (WHO, 2015)

Further, for the purposes of this research, basic sanitation also follows the WHO definition, i.e. "basic sanitation is the lowest-cost technology ensuring hygienic excreta and sewage disposal and a clean and healthful living environment both at home and in the neighbourhood of users. Access to basic sanitation includes safety and privacy in the use of these services. Coverage is the proportion of people using improved sanitation facilities: public sewer connection; septic system connection; pour-flush latrine; simple pit latrine; ventilated improved pit latrine" (WHO, 2015)

1.2 The focus on Ghana

The current situation of sustainable access to safe drinking water is pressing in the sub-Saharan countries, considering the number of sub-Saharan countries that are currently focused on by the most prominent NGOs and international organizations, i.e. UN, WHO, etc.

(Nexus Strategic Partnerships Limited, 2015; United Nations, 2015a; Water.org, 2015; Wateraid.org, 2015; WHO-Unicef Joint Monitoring Programme, 2014). In order to be able to provide more in-depth analysis and overview, I propose to concentrate on Ghana, which is especially stricken with this problem, and also considering that a number of NGOs and intergovernmental organizations focusing on this topic are active in the country, arguing that the research would be highly relevant in Ghana.

As described "*Ghana is one of the most densely populated countries in West Africa. Its northern regions are particularly deprived, with one in ten children dying before their fifth birthday. 80% of all diseases in Ghana are caused by unsafe water and poor sanitation. More than nine million people do not have access to safe drinking water. Only around 13% of the population have access to adequate sanitation facilities*" (Wateraid.org, 2015). According to another source, "*despite an investment of roughly a half a billion US dollars in infrastructure development over the past 20 years from the government and its partners, many people in Ghana still lack affordable access to safe water. Although progress has been made, however, current estimates indicate that 29% of all rural and peri-urban hand pumps are broken, and an additional 49% are partially functioning*" (SafeWaterNetwork, 2015).

A sign showing that the local government considers it an important topic as well, is that based on a recent WHO study, the Ghana constitution recognizes right to water and sanitation as a human right (World Health Organization, 2014).

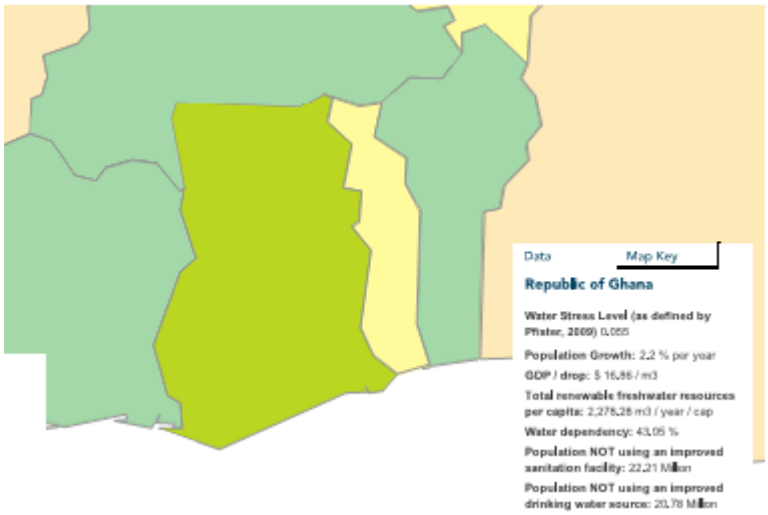

Figure 1: Water stress in Ghana (Growing Blue, 2015)

1.3 Knowledge gap and aim of research

Knowledge gap to address

Considering the above, the knowledge gap to address is twofold. On the one hand, it would be a worthy addition to the available literature to provide a current assessment of water governance and management in Ghana, with regard to sustainable access to safe drinking water and basic sanitation, and in this thesis, I will attempt to provide such an overall assessment. Some literature does address certain parts of Ghana (Adubofour, Obiri-Danso, & Quansah, 2012; Alexander et al., 2015; Asante, Berger, Engel, & Iskandarani, 2002; Eguavoen, 2008; Mahama, Anaman, & Osei-Akoto, 2014; Opryszko et al., 2013; Peloso & Morinville, 2014), and focus on certain aspects, such as households, purification technology, supply and demand (Machdar, van der Steen, Raschid-Sally, & Lens, 2013; Stoler, Tutu, & Winslow, 2015; Stoler, Weeks, & Appiah Otoo, 2013; Thompson, 2014). But only one, rather concise overall assessment is available (Awuah, Nyarko, & Owusu, 2009) and even that does not consider all aspects of water governance that this thesis aims to address.

Aim of research

The objective of this research is to contribute to solving the issue of sustainable access to safe drinking water and basic sanitation in Ghana in the long term by identifying strengths and weaknesses of the current water governance structure in Ghana based on a systematic review of the current structure through a specific water assessment framework, in order to come up with recommendations on how to improve water governance practices.

The research will be a practice-oriented research, as it is "*meant to provide knowledge and information that can contribute to a successful intervention in order to change an existing situation*" (Verschuren & Doorewaard, 2010). As such practice oriented research, it will have the double aim of (i) problem finding/ analysing: difference between an existing or expected and a desired situation (Verschuren & Doorewaard, 2010); and (ii) diagnosis - causal model (ibid), with the aim to come up with recommendations on water governance practices in Ghana.

Thus, the main research question to address this knowledge gap and address the aim of the research is:

What are the strengths and weaknesses of Ghana's water governance in terms of sustainable access to safe drinking water and basic sanitation when comparing to the industry best practice that is represented by the Dutch water governance?

In the chapters below, I consider the below sub questions, each of which contributes to finally answer the main research question.

- *What elaborated concepts of good water governance, built on the van Rijswick et al (2014) framework can be found in literature?*
- *What criteria can be used to operationalize the concepts?*
- *To what degree does the Dutch water governance meet the criteria?*
- *To what degree does the Ghanaian water governance meet the criteria?*
- *In what respects do the two countries differ?*

1.4 Research framework and research questions

Research framework

Considering all of the above, the water management and governance assessment framework, developed by van Rijswick et al (2014), the below research framework (*Figure 2*) was developed:

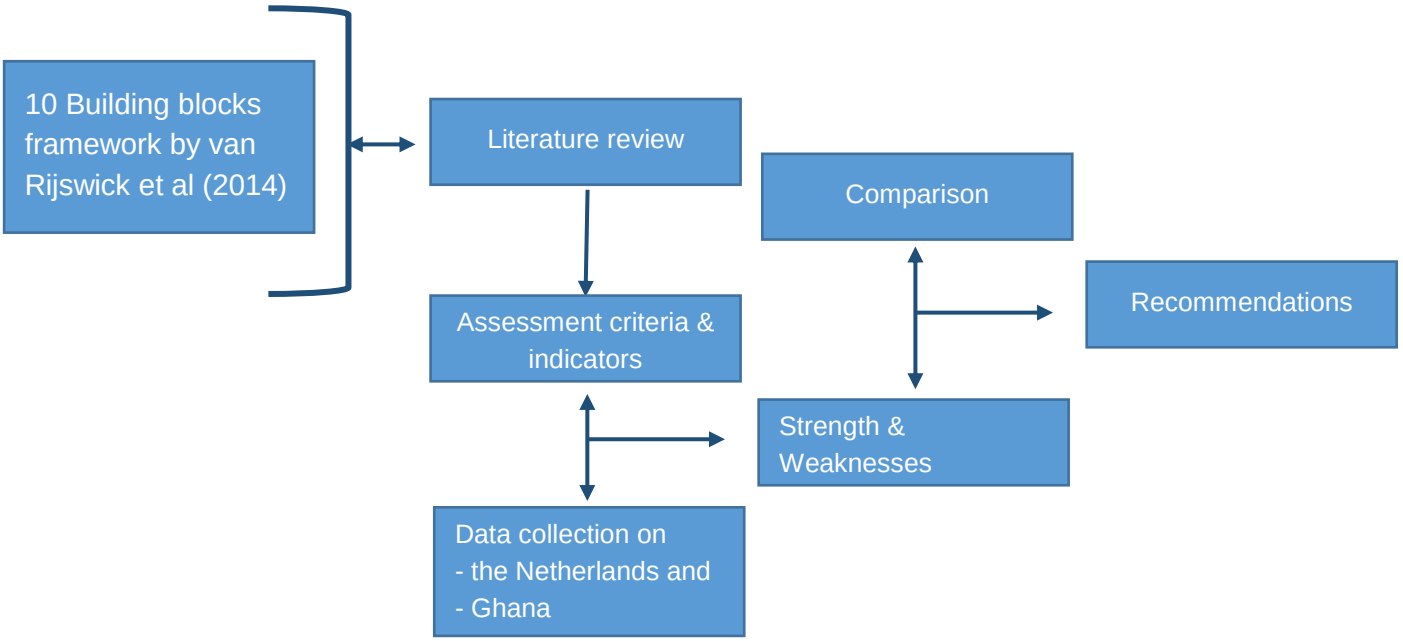

Figure 2: Research framework

Research questions

Based on the above, the following central research question is posed:

Q: What are the strengths and weaknesses of Ghana's water governance in terms of sustainable access to safe drinking water and basic sanitation when comparing to the industry best practice that is represented by the Dutch water governance?

In order to be able to address this question, several sub-questions will need to be posed and answered first, each contributing to answering this main question, as listed earlier.

1.5 Scientific and societal relevance

Scientific relevance

The scientific aspect of the research would be to (a) test the relevance of the assessment framework provided by van Rijswick et al., (2014) and amend, as applicable; (b) to elaborate on each of the building blocks developed by van Rijswick et al (2014) and (c) to address the scientific knowledge gap, as mentioned above.

In relation to the Sustainable Development- Environmental Governance research program at Utrecht University, this thesis is intended to be a useful contribution to the empirical field of water governance by providing an analysis of the current Ghanaian water governance practices, focusing on sustainable access to safe drinking water and basic sanitation to understand in this specific area "what works, where and why" in a sustainable way, while comparing it to the advanced and progressive water governance system of the Netherlands.

Societal relevance

The societal relevance of the research lies in discovering strengths and weaknesses in the water governance and management of Ghana with regard to sustainable access to safe drinking water and basic sanitation. Further, to come up with recommendations to address the possible shortcomings of the current system that constitute obstacles to provide sustainable access to safe drinking water and basic sanitation.

Applicability of the results in policy

Considering the results of proposed research there are a few possible applications to which they could lead.

Firstly, based on the assessment of the water governance and management practices with regard to sustainable access to safe drinking water and basic sanitation in Ghana, the strength and weaknesses discovered could be used in themselves as areas of focus for policymakers as well as involved NGOs and other stakeholders.

Further, hopefully, the recommendations of this thesis could also be utilized by the relevant agencies, governmental and NGOs.

Naturally, as expected, both strengths and weaknesses would be found across all aspects of water governance in Ghana, thus application of the findings of this research could provide a useful base for further action for all involved parties, in order to improve the availability of sustainable drinking water and basic sanitation in Ghana.

Relevant stakeholders

Regarding the given topic and geographical focus, relevant stakeholders include: (i) local government(s); (ii) LNGOs; (iii) all locally active international NGOs, making efforts towards sustainable drinking water and sanitation; (iv) intergovernmental organizations, e.g. UN, WHO; (v) local political elite (possibly); (vi) local individual stakeholders.

1.6 Outline of the report

The report will build on the theoretical framework developed by van Rijswick et al (2014), conceptualize in more detail what good water governance is (Chapter 2), then operationalize the criteria and elaborate on the methods of data collection (Chapter 3). Further, in order to establish a benchmark, data of the Netherlands will be presented (Chapter 4), following that, results on Ghana will be presented (Chapter 5). The next chapter will include comparison of the countries and contrasting to establish strengths and weaknesses based on the earlier (Chapter 6), which will be followed by a conclusion, discussion and recommendations (Chapter 7).

In it, I will answer the questions of what entails good water governance specifically when talking about sustainable access to safe drinking water and basic sanitation, how to measure it, and what are the strengths and weaknesses of the water governance in Ghana, with a comparison to the Dutch water governance.

2 Conceptualization of good water governance

2.1 Introduction

Following the introduction of the problem context earlier, the coming chapter includes more detailed definitions of the different aspects of water governance in relation to sustainable access to safe drinking water and basic sanitation, i.e. conceptualization of governance capacities.

For these, as a base, I will use the assessment framework developed by van Rijswick et al (2014), and add further relevant literature review on each of the building blocks, in order to conclude, what would constitute good water governance in relation to sustainable access to safe drinking water and basic sanitation.

As mentioned before, the recent article of van Rijswick et al. (2014), provides an integrated assessment framework of water management and governance. It enables its users to discover gaps that can be addressed later on. This assessment framework addresses: water governance on an interdisciplinary base, focusing on both content, organization and implementation aspects of water governance, which, together, aim to cover the full cycle of water governance from knowledge about the system, values, principles and policy discourses contributing to the development and running of water governance; the trade-offs between social objectives, responsibilities, authorities, means, regulations and agreements, financing, engineering and monitoring, enforcement and conflict prevention and resolution practices. The integrated assessment framework focuses on three main areas of content, organization and implementation, and lists ten building blocks to consider, see *Figure 3*.

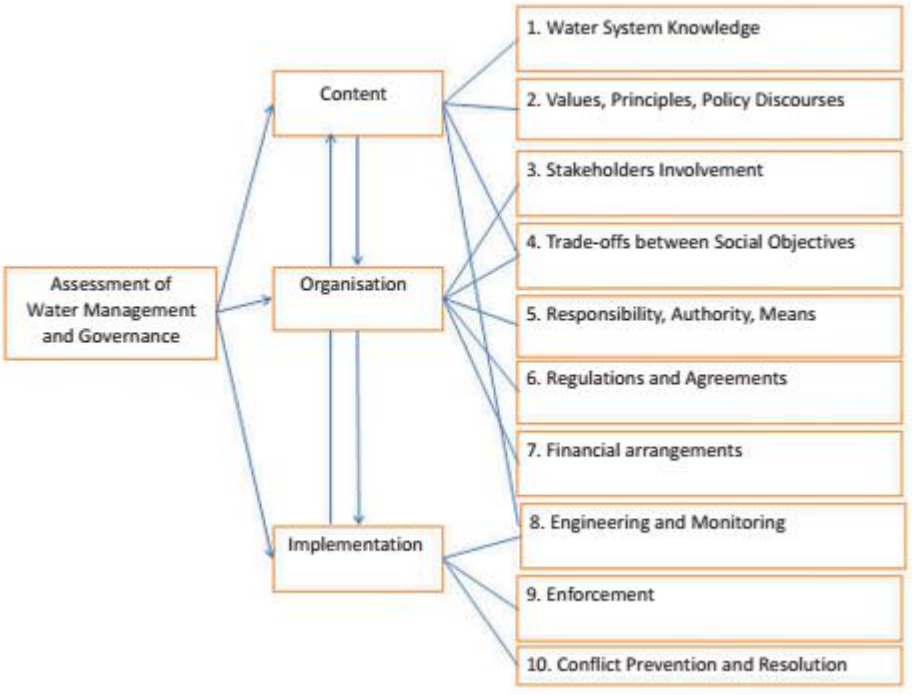

Figure 3: Multiple dimensions of water management and governance (van Rijswick et al., 2014)

The ten building blocks are developed to include different aspects of water management and governance, and are as follows:

(1) ***Water system knowledge*** covering natural resources and man-made infrastructure; knowledge about functions for society as well as changes in the environment. Further, knowledge about demand, supply and quality of fresh water, as well as flood risks – assessment of it including probability of failure and consequences of it.

(2) ***Values, principles, policy discourses***; covering what is considered as legitimate solution, trust in the integrity of partners, common interests, flood protection, sustainable and fair use of resources. Principles are of a more general character. Narratives are the different policy discourses, dialogues, based on the way facts are framed considering local values.

(3) ***Stakeholders involvement***; focuses on the way different stakeholders' involvement would enhance the quality of policy proposals as well as their legitimacy. This would refer to the inclusion of each stakeholder in the policy process as well as the degree to which each of them has the opportunity to influence the process.

(4) ***Trade-offs between social objectives: service-level agreements***; considers the various social objectives that effect the allocation of water resources, regarding quantity, quality and safety. Further, this aspect also covers any possible reform on existing service level agreements, and considers allocation mechanisms.

(5) ***Responsibility, authority, means***; considers whether property rights are determined, are rights of water treated as private, common, public or non-property (res nullius). Further, it deals with the presence or absence of authority with responsibility and means to empower such authority.

(6) ***Regulations and agreements***; considers whether such regulations and agreements are in place as a first step, and if yes, are they appropriate, considering the governmental organization, legal traditions, involved parties and local characteristics. Further, it considers legitimacy, regarding shared values and principles, conformity with the rule of law, whether they are enforceable and effective, and whether they provide flexibility for possibly changing circumstances as well as certainty and enforceable protection level.

(7) ***Financial arrangements***; considers methods of financing, whether it is based on a solidarity principle, a profit principle or the polluter pays principle, or another, outside financing method (e.g. international aid).

(8) ***Engineering and monitoring***; physical capacity of the water system infrastructure including canals, pipes, etc. and whether they meet societal functions and option for monitoring the water system to assess whether the system meets agreed service level agreements.

(9) ***Enforcement***; considers ways in which agreed upon procedures, standards and rules are actually enforced. Further, this building block concerns itself with implementation techniques, processes, whether agreements are to be enforced by public parties or private parties and if there are any remedies available to achieve the objectives.

(10) ***Conflict prevention and resolution,*** considers whether there are sufficient or any conflict prevention and resolution mechanisms in place.

As part of the "*Values, principles, policy discourses*" chapter it is essential to consider local culture, with focus on its attitude towards water and sanitation, and maybe consider gender divide, as UN Water argues "among the many water-related challenges worldwide, the crisis of scarcity, deteriorating water *quality, the linkages between water and food security, and the*

need for improved governance are the most significant in the context of gender differences in access to and control over water resources." (World Development Report, 2012).

2.2 Content

Water system knowledge

Van Rijswick et al (2014) define water systems as the combination of natural physical resources and man-made infrastructure, supporting different societal functions. It considers the necessary knowledge about it to be dependent on the different societal functions it supports. It covers water-related ecosystems as well. Knowledge, according to the authors, would encompass knowledge about ecosystem processes, and properties of infrastructure. The necessary knowledge about each water system should consider that its functions change over time, together with the natural resources that support this infrastructure. Therefore, it is also essential to know the impact the changes in both the natural system as well as the infrastructure would have on the rest of the system. Uncertainties include both impacts of changes and impact of measures to counteract these changes, as well as scientific uncertainties in predicting these impacts. Further, the authors elaborate on knowledge about natural water resources, in terms of demand, supply and quality of fresh water, referring to availability and use of water. In the authors' opinion this calls for a basin approach. On the man-made infrastructural side, investment into water resources development, and organization process are highlighted, referring to over-pollution of water, as more entitlements having been issued than what is sustainable.

When looking for further water governance aspects of water systems knowledge in scientific literature, one of the most cited articles is by Elinor **Ostrom**, on a general framework for analysing sustainability of social-ecological systems (Ostrom, 2009). Ostrom refers to the knowledge about several aspects of the system under review, such as the social, economic and political settings, resource units, resource systems, governance system, users, interactions between these systems, outcomes of these interactions and related ecosystems, thereby collecting knowledge from several scientific disciplines (Ostrom, 2009). From this system, several would correspond to different building blocks in the van Rijswick et al (2014) framework, i.e. the economic settings would correspond to the financial arrangements, the governance and political system to the policy discourses, stakeholders' involvement, and trade-offs, responsibility -authority, and regulations and agreements, whereas users to stakeholders' involvement. Ostrom considers that the number of users has an impact on the chances of self-organization, and other forms of stakeholder involvement. Specifically considering water governance, Ostrom (2009) mentions that costs of observation are higher in the case of mobile resource units such as water.

Further, **Pahl Wostl et al** (2007), in their article on the social learning and water resources management, focus on a concept for social learning and collaborative governance, as a water resource management form. Experts have recently developed and implemented management practices designed to work with the human dimension in the system. Stakeholder involvement, a factor of increasing importance, leads to consider collaborative governance through stakeholder involvement. Further, social learning seems to be the most appropriate for integrated and adaptive management regimes dealing with complex social-ecological systems. In conclusion, there is an emphasis on requirements for social learning to include institutional settings that guarantee stability and certainty while staying flexible. The analyses conclude that development of such settings involves ongoing processes of social learning. In these processes, stakeholders are in flexible networks that allow participants to develop capacity and trust to collaborate in both formal legal structures, and also in formal, voluntary agreements.

Bogardi et al's article on water security for a planet under pressure, dealing with interconnected challenges of a changing world (Bogardi et al., 2012), argue for equitable allocation and protection of water resources, which, they suggest, should occur within the framework of integrated management and water governance. The authors highlight the issue that implementation is problematic. The reasons they cite for this, are ongoing global climate change, increasing population, urbanization, and aspirations for better living standards. All of which are influencing the change of water management needed, as they influence the societal functions that water is used for. Furthermore, large-scale impoverishment of aquatic biodiversity, ecosystem degradation and reductions in water quality are unaddressed 'side effects' in areas where water can be secured for human and economic uses. The water-related aspects of the socio-ecological, economic and geophysical systems on all scales should be considered both in technical interventions and in governance frameworks. The authors further highlight that humankind has been changing the global water system since the industrial revolution, without adequate knowledge of the system and its response to change. These same changes have also been made without sufficient understanding of how to govern the system at local and global scales. In conclusion, there is a call for a better linkage of science and policy, as well as innovative and cross-sectoral initiatives, adaptive management and governance models that involve all stakeholders in order to reach water security in the 21st century.

Further, **Engle et al** (Engle, Johns, Lemos, & Nelson, 2011), in their article about integrated and adaptive management of water resources, discuss tensions and legacies within integrated water resources management (IWRM) and adaptive management (AM) as two institutional and management paradigms designed to address shortcomings within water systems governance. The limits of hierarchical water institutional arrangements in the case of IWRM and the challenge of making water management decisions under uncertainty in the case of AM. Although, there have been attempts to merge these paradigms to address the growing complexity, however, because many of these approaches have received little empirical attention, questions remain about how they may be implemented. In conclusion, knowledge about the water system that is needed include interactions, tensions, trade-offs between different institutions/mechanisms perceived as desirable.

On a more practical level, **Dai** (2014), discusses aspects, such as number of rivers, area of river basins, volume of water resources, geographical distribution of water resources, water pollution and scarcity as indicators about water systems knowledge for a given geographical unit, such as a country. Further, she considers local classification system to discuss water quality in her focus country, China.

Castro (2007) considers both the techno-scientific as well as the socio-political fields of knowledge related to water, when arguing that although the techno-scientific part has been well-researched and documented, more knowledge is needed on the historical, political, cultural, socio-political issues related to water crisis. From his perspective, the following details on water system knowledge should be discovered.

Rationality	*Indicators*
Techno-scientific	Quantitative indicators
	Physical-natural and technical conditions and drivers
	Water resources
Policy-administrative	Bureaucratic norms
	Electoral and party-political considerations
Ecological	Indicators of sustainability-unsustainability
	Ecosystems
Socio-political	Power configurations
	Structural inequalities
	Social identities

	Languages of valuation

Table 1: Water system knowledge indicators and rationalities (Castro, 2007)

Further, more practical aspects of water systems knowledge could include the percentage of people accessing pipe water, as opposed to those, with access to only illegal tap connections or drawing water from unprotected sources such as well water or water tankers. Another measure in relation to water systems knowledge would be the percentage of people without access to safe drinking water, or basic sanitation, or quantify access level in terms of time or distance to the nearest safe and sustainable source or basic sanitation unit.

In the ideal case, based on the above, the water system knowledge aspect of water governance would need to cover the actual status of the natural water system, including: number of rivers, size of river basins, total volume of water resources (blue and green-water) and geographical distribution thereof; changes in the natural water system's composition, including virtual water influx/ outflow. Further, it would have to include a detailed description of the societal functions of the water system, per geographical focus area. In addition, the water system knowledge would have to cover the expected changes in the natural water system and that of the planned infrastructure, as well as the demand and supply of fresh water and quantitative and qualitative descriptions of the available water. Finally, for easier global comparison, qualitative categorization of the water system would need to correspond to other, possibly globally accepted water qualification systems.

In conclusion, the following aspects of the water system would be ideally known in the given country and would be available to water policy makers and involved stakeholders – including the questions that need to be answered in order to discover the current status of knowledge in this area:

Topics	**Conceptualization**
What is the societal function of the water system?	Categories: Industrial, agricultural, private use of population per focus area (village/ town/ county/ province)
What are the changes in the natural system and the infrastructure?	Changes in recent decades, including changes in the infrastructure, in the usage of the same infrastructure, in the available blue water/ green water. What is the virtual water influx/ outflow What are the demographical changes, e.g. change in the population living in villages vs. cities, number of people; changes in the natural water system.
What is the demand/ supply of fresh water?	Is there an overview of the demand and supply of fresh water? What is this information based on – is it based on the basin system? Is the demand/ supply categorized further by type of use?
What is the quality of fresh water?	What is the classification system in place? Is it based on, or comparable to any available global qualification system in place?
Resource units	What are the resource units defined and considered in water governance?
Quantitative water system knowledge	What are the number of rivers, area of river basins, volume of water resources, geographical distribution of water resources, water pollution and scarcity?
Techno-scientific aspects	Quantitative indicators
	Physical-natural and technical conditions and drivers
	Water resources
Ecological aspects	Indicators of sustainability-unsustainability
	Ecosystems

Table 2: Concepts of water systems knowledge

Values, principles, policy discourses

Values

Van Rijswick et al (2014) define ***values***, as dependent on historical, cultural, normative and political views. Value is something that is treasured, something of importance. The authors argue that in relation to water governance trust, and common interests are invaluable to encourage participants to find shared values. In relation to the current focus, i.e. sustainable access to safe drinking water and basic sanitation, value could be conceptualized as the availability of sufficient and clean (drinking) water and basic sanitation to all, the sustainable and fair use of resources, or the no harm principle (Warner & van Buuren, 2009).

In his article about water governance in the 21st century, **Castro** (2007), focuses on the importance of a shared understanding of water crisis, including also the historical, cultural, socio-political aspects of it. As such, he argues for an interdisciplinary approach as an underlying value. Further, whether water is reduced to only one of its many dimensions, or more. Another aspect is whether to consider essential water services such as water and sanitation as public goods, a social right, and a universal human right, or a private good or commodity.

In the country specific overview of water governance in China, **Dai (2015)** focuses on the country's traditional philosophical attitude towards nature, and the mutual interdependence and harmonious coexistence. She further bases water related values on results of national polls on public view of water as value, as well as underlying the government's ongoing actions towards improving access. Additionally, the role and value of socialist and communist ideas in the country has a significant impact on all aspects of governance, including water governance.

According to **Antunes, Kallis, Videira, & Santos** (2009), in their article on the participation and evaluation for sustainable river basin governance, they argue that by engaging in a participatory process would allow to discover framings, perspectives, values and interests, as well as understanding of social and institutional aspects in water governance.

Further, more practical aspects of values could be deduced from reviewing underlying values in a given country's constitution or other basic legislature, or from the recent article by **Hanjra et al** (2012), where we can conclude that values include the protection of human health and environment, which are sometimes missing in developing countries. For water management solution, they argue for adaptive co-management and inter-sectional policy making.

In conclusion, in the ideal case, the values aspect of water governance would need to include, based on the most relevant literature: the collection of common interests in relation to water, and more specifically sustainable access to safe drinking water and basic sanitation. The underlying values, such as the availability of sufficient and clean drinking water and basic sanitation to all, the sustainable and fair use of resources, no harm, protection of human health and the applicable ideology of the country, if any such exists, would also reveal the underlying values. Further, both participatory processes and the country's basic legislation would also reveal the underlying values.

Topics	Conceptualization
Common interests	What do stakeholders consider as common interests in relation to water policy?
Availability of sufficient and clean (drinking) water and basic sanitation to all	How is the availability of sufficient and clean drinking water and basic sanitation to all included in the water policy? Is it one of the underlying values?
Sustainable and fair use of resources	How is the sustainable and fair use of resources viewed? Is it included in any water policy document as

	an underlying value?
No harm	How is the no harm principle considered in the water policy documents? Is it considered at all?
Universal approach	In water policy is both the techno-scientific knowledge, and also the historical, cultural, socio-political aspects considered?
Water as universal human right	How is sustainable access to safe drinking water and basic sanitation considered in the water policy? As a public good, as a universal human right, as a private good/ privilege?
Public view	What is the public view on water based on national polls, if any such exist?
Underlying ideology	What is the country's ideology or religion, if any such exist?
Discovering underlying values	How is the participation of different stakeholders aimed at discovering underlying framings and values regarding water policies?
Protection of human health and the environment	What is the view on the protection of human health and the environment based on the constitution or other underlying basic legislation?
Equitable allocation and protection of water resources	How are water resources allocated among societal functions, what is the underlying value system? Is it equitable? How are water resources protected? What do you mean under protected water resources?

Table 3: Conceptualization of Values

Principles

Principles are more general in character, they are the underlying fundaments from which values are drawn, they can be interpreted via reading between lines of policies. **Van Rijswick et al** (2014), cite principles such as decentralization, subsidiarity or integration as examples for institutional principles. Further, the authors cite principles of good governance, such as proportionality and public participation, environmental principles such as prevention principles, or polluter pays principle, and technical principles, such as from global design to localized, detailed design.

Castro (2007) considers principles such as whether water is seen as a common good, and essential water services as public good, that should not be governed through market forces, or the exact opposite, i.e. water as an economic resource.

According to **Dai** (2015), principles can be deducted from already existing environmental and water policies, which does not seem very detailed, or thoroughly analysed method to find underlying principles of the given water governance.

Huntjens et al (2012) write about institutional design propositions for the governance of adaptation to climate change in the water sector. The authors cite **Ostrom** (1990) considering eight design principles for water governance on a local scale: (1) clearly defined boundaries; (2) proportional equivalence between benefits and costs; (3) collective choice arrangements; (4) monitoring; (5) graduated sanctions; (6) conflict-resolution mechanisms; (7) minimal recognition of rights to organize; and (8) nested enterprises. The water governance design principles cited by Huntjens et al (2012) that build on Ostrom's (1990) design principles include clearly defined boundaries; equal and fair (re)distribution of risks, benefits and costs; collective choice arrangements; process monitoring and evaluation; conflict prevention and resolution mechanisms; polycentric governance; robust and flexible process and policy learning.

Falkenmark & Lannerstad (2004) in their article on the consumptive water use to feed humanity, consider uses of blue and green water in a consumptive water use and conclude

that a fully developed food trade system would allow for global maximisation of comparative advantages. For the current topic, the principle applicable would be that water governance considers both green and blue-water usages, as well as the trade system, i.e. the virtual water flows.

On their article on water governance and poverty, **Franks and Cleaver** (2016), consider such overarching principles as the emphasis on outcomes, in terms of access, livelihood, social structures and political voice, while also considering mechanism of access and ecosystem outcomes.

Wiek & Larson (2012), refer to social-ecological system integrity, resource efficiency and maintenance, livelihood sufficiency and economic opportunity, socio-ecological civility and democratic governance, inter-generational and intra-generational equity; interconnectivity from local to global scales, precaution and adaptability.

Further conceptualization of principles can be found in the different aspects of regulations and institutional set up regarding safe drinking water and basic sanitation, i.e. the presence or absence of tacking issues at the source (can be applied to basic sanitation more than to drinking water); whether it complies with the general criteria of good governance (UN ESCAP, 2010).

In conclusion, ideally, water governance principles can be summarized to include decentralization, proportionality, public participation, prevention, polluter pays principle, technical principles, principles regarding the value of water as a human right, emphasis on outcomes, and tackling issues at their source. Further, clearly defined boundaries; equal and fair (re)distribution of risks, benefits and costs; consideration of both actual and virtual water flows, value of water as public good, private good, or non-good. An ideal water governance structure would have an emphasis on outcomes, and tacking issues at the source -with a system that would allow escalating issues appropriately.

Topics	Conceptualization
Decentralization, Subsidiarity or integration Proportionality, Public participation, Environmental principles - prevention principles, polluter pays principle, Technical principles - from global design to localized, detailed design	How is the water governance system set up? Centralized vs. decentralized? Hierarchical vs. non-hierarchical? Proportionality considered vs not? Public participating or not? In what way is prevention considered? How are polluters of water resources required to pay for their pollution? How is the water system design developed, global design focused or detailed design focused?
Global consideration	Are both actual and virtual water flows considered? If yes, how?
Principles regarding the value of water	How is water considered? Public good, private good, non-good?
Clearly defined boundaries; Proportional equivalence between benefits and costs	How are boundaries defined? Is there a proportional equivalence between benefits and costs?
Emphasis on outcomes	How are the outcomes of access, livelihood, social structures and political voice considered in the water policies?
Tackling issues at the source	At which level are arising issues considered? What is the system of escalating issues regarding sustainable access to safe drinking water and basic sanitation?

Table 4: Conceptualization of principles in water governance

Policy discourses

Policy discourses can be understood as the "different ensembles of actors with specific storylines, frames, values, principles that emphasize certain aspects" (van Rijswick et al., 2014) of the issue at hand. In order to understand these policy discourses, one needs to see the values, background and viewpoints of the actors involved. Further, to see which courses of action, viewpoints, contents are included or excluded from the policy discourse, i.e. focus on the framing of the discourse. Framing is the process of selection, focus and embedding of the chosen aspects of a problem domain (Dewulf, Mancero, Cárdenas, & Sucozhañay, 2011).

As for policy discourses, the general governmental communications can provide a good starting point to see how issues around water governance are framed and perceived, and it should be noted that the local political structure would have significant impact on the policy discourses that take place (Dai, 2014).

Roberts (2008), comments on the accumulation of water, considering the general shift toward the intensification of the commodification under neoliberalism and the context in which the water services sector have transformed. She further highlights links between accumulation and social reproduction. Finally, the author explores a new discourse on water governance that advocates a more active role for governments in the water sector and for the incorporation of the "voices" of women and the poor in the development of sustainable and equitable water policies.

Lautze, De Silva, Giordano, & Sanford (2011) argue for underlying qualities to be included, such as openness, transparency, broad participation, predictability, ethics and integrity. Further, that water governance should include processes, institutions and actors. **Mollinga** (2010), brings into the picture the Marxist approach to water governance, i.e. that the basic issue is the capture of state power has generated interest in the nature (class character) of the state but little interest in the concrete state practices.

In conclusion, in an ideal situation, policy discourses would need to cover the widest variety of voices, provide an insight into the values, background and viewpoints of the actors involved, as well as identifying the blind spots of the policy discourse by seeking out the excluded values, background, viewpoints and actors. Ideally, special attention would be paid to the incorporation of underrepresented voices, and provide an insight into the underlying qualities, e.g. openness, transparency, predictability, ethics and integrity, and reveal about the state power's interest in nature.

Topics	Conceptualization
Policy discourses	Which courses of action, viewpoints, contents are included or excluded from the policy discourse?
Frame and perception	What do government communications reveal about policy discourses?
Incorporation of the underrepresented voices	How are voices of women, the poor and any other marginalized groups included in water policy discourse?
Underlying qualities	How are underlying qualities included in the water policies? E.g. openness, transparency, broad participation, predictability, ethics and integrity.
State power's interest in nature	What type of involvement does the state have in water policy?

Table 5: Conceptualization of policy discourses in water governance

Stakeholders involvement

Considering the complexity of water governance processes, and the number of different stakeholders involved, for the sake of better inclusiveness or forced by circumstances, governments may give room to stakeholders to influence decision-making (van Rijswick et al., 2014). As shown in earlier studies, involvement of stakeholders in general enhances the content of policy proposals by using the information and accumulated knowledge at the different stakeholders, as well as making a more transparent decision-making process. Further, such practices create more support and legitimacy for policy measures (van Rijswick et al., 2014). Strong stakeholder involvement would be defined with the width and depth of involvement (Berry, Portney, & Thomson, 1993), where *width* is considered to be the inclusiveness of all members of society, while *depth* is the degree to which the final outcome of the policy can be influenced by each stakeholder. In order to evaluate the level of stakeholder participation, one needs to look for the opportunities for stakeholders to be involved, as well as the articulation of interests, if possible.

Engle et al (2011) argues for the type of stakeholder involvement that may be most beneficial for a given geographical unit, and come to the conclusion that although integrated systems may be more legitimate and accountable than top-down command and control ones, such mechanisms may be at odds with the flexible, experimental, and self-organizing nature of other types of management styles.

Stakeholders involvement is essential to strengthen the governance, and achieve a better inclusiveness and transparency, especially, as the water crisis is argued to be a governance crisis (**Castro, 2007;** UNESCO, 2006)

Types of stakeholders involvement can be via expert panels, public hearings, written statements of follow-up from the commission (**Antunes et al**., 2009). Methods of stakeholder selection to participate in the process can also influence the legitimacy and practicality of their involvement (Antunes et al 2009).

In the applied study on the water governance of China, **Dai** (2015) applies the Aarhus Convention (United Nations Economic Commission for Europe, 2001) to consider the level of stakeholders involvement. The Aarhus Convention can be operationalized along the presence, absence or level of availability of the following three pillars: access to information, participation in decision making and access to justice.

Fenemor et al (2008) consider collaboration with stakeholders as having two main purposes: building knowledge and commitment of resource users towards sustainable resource management, and stakeholder involvement in resource management itself.

Schoeman, Allan, & Finlayson, (2014), consider the failure of conventional approaches to achieve equitable and sustainable water management resulting in a “new water paradigm” that emphasizes broader stakeholder involvement in terms of (i) integration; (ii) attention to the human dimensions of management; and (iii) wider recognition of the economic, ecological and cultural values of water.

Gallego-Ayala & Juízo (2014) in their article on integrating stakeholders' preferences into water resources management planning consider stakeholder participation as a key principle of integrated water resources management. The authors applied the analytical hierarchy process (AHP) method to evaluate stakeholders’ involvement and participation. They concluded that there are differences in stakeholders’ individual group preferences regarding water resources management objectives and management options. Furthermore, that there is potential utility of the AHP methodological framework in facilitating stakeholders’

participation and involvement in planning and decision-making processes for the development of water resources management plans. The application of this approach could add to the improvement of water governance through higher commitment of stakeholders.

Another aspect as to why shareholder involvement is important is the fact that scale and level contests arise in discussions as different actors prefer different temporal or spatial scales and levels in their analysis, arguments, and responses. Scale contests might include whether to privilege administrative, hydrological, ecosystem, or economic boundaries. Level contests might include whether to privilege the sub-district or the province, or the local or the regional economy (Dore & Lebel, 2010). Further case studies illustrate that the lack of comprehensive consultation and the low level of participation of the community on the participatory scale does not achieve much in terms of people-centred benefits. For governance at the local level to be effective, participation should be inclusive and communicative so as to enhance transparency (Garande & Dagg, 2005).

Further considerations include the first step of identification of stakeholders, identification of the percentage of stakeholders involved and represented in policy making, and whether their interests are considered and balanced in the analysis and decision making process. It is also important to see whether there is free or easy access to information, including policy documents, access to discourse on policy changes, and if there are forums available to discuss regarding access to drinking water and basic sanitation.

In conclusion, the ideal would be to have both deep and wide stakeholder involvement, after the initial step of identifying all stakeholders in the issue, with the mode of involvement to cover a wide variety of methods from expert panels to written statements and covering a wide spectrum of stakeholders. The aim of such thorough, inclusive stakeholder involvement would be to both build knowledge and involve in water management, and increase transparency. Ideally, stakeholders' involvement would provide them with both access to information, participation in decision making and access to justice, considering, further, that the more committed they are, the better the implications for the water governance.

Topics	**conceptualization**
Width of stakeholder involvement	Which groups of the society are included in the decision-making progress? What percentage of the population does this cover?
Depth of stakeholder involvement	To what degree can these groups influence the final outcome? What is the depth group by group?
Flexibility – rigidity of stakeholder involvement?	Is stakeholder involvement of the command and control type? Or more of a flexible- self-organizing type?
Methods of stakeholder involvement	expert panels, public hearings, written statements of via follow-up from the commission
Aarhus Convention's aspects	Presence, absence or level of availability of (1) access to information, (2) participation in decision making and (3) access to justice
Aim of stakeholder involvement	Building knowledge Involvement in water management Other?
Scale and level contests	What does the current water management system privilege: administrative, hydrological, ecosystem, or economic boundaries? (Scale) What does the current water management system privilege: sub-district or the province, the tributary watershed or the international river basin, a river or a biogeographic region, and the local or the regional economy? (Level)

Table 6: Conceptualization of stakeholders' involvement in water governance

2.3 Organization

Trade-offs between social objectives

Trade-offs between social objectives are understood by **van Rijswick et al** (2014) as allocation and reallocation of scarce resources, via allocation mechanisms. *Allocation* of water resources can be understood as "*combination of actions that enable water users and water uses to take or to receive water for beneficial purposes according to a recognized system of rights and priorities*" (UNESCAP, 2000). Thus, allocation focuses on different objectives and trade-offs that it is aiming to achieve. In relation to *reallocation*, note the mechanisms of transition from earlier existing allocations between objectives to the new objective system, that is expected to happen if the transition costs, both monetary and non-monetary (difficulties, energy, time, etc.) will be less than gains by new beneficiaries.

Water related service level agreements can be understood as water allocation mechanisms (price, market, rules) as well as quality and safety standards. Thus, according to van Rijswick et al (2014), trade-offs between social objectives can be measured by probing if the agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives.

Dai (2015), considers the allocation of rights and priorities of different water allocation procedures, the option to target the issue as a fully government controlled topic, or a completely market-controlled topic, or a mixture. Further, she discusses development and allocation according to the local water law, and the national water resources strategic plan that regulates, among others, the allocation and reallocation methods and responsibilities.

Swyngedouw (2005) considers how tactics of 'accumulation by dispossession' have become essential strategies in global dynamics, assessed in the context of the recent privatization and de-collectivization of water resources. Firstly, the current wave of privatization policies is put in historical and political context, afterwards, the central and contradictory role of the State or state-like institutions, together with strategies of dispossession are discussed. This leads to a consideration of the continuing centrality of 'governing' institutions in the organization and regulation of the water sector, and to a discussion of the weakened position of the citizen against these methods of water governance.

Moss & Newig (2010), consider the multiple challenges that environmental governance and management face that relate to spatial scales and multiple levels of governance. They delineate their understanding of problems of scale and the dimensions of politics central to water resource management, arguing that biophysical and societal context matters immensely in choosing the optimal scale on which the given water governance issue is to be solved.

Bogardi et al (2012) consider the following challenges when talking about water governance: (i) meeting basic (human) needs; (ii) securing food supply; (iii) protecting ecosystems; (iv) sharing water resources; (v) managing risks; (vi) valuing water; and (vii) governing water wisely.

Further considerations on trade-offs between social objectives could include availability of a Water Law in the country, dealing with allocation and reallocation of water resources between functions, as well as the allocation mechanisms of that Water Law, if any. Whether service-level decisions based on trade-offs, costs, benefits, and distributional effects.

In conclusion, based on the above, in an ideal world, the trade-offs between social objectives would be based on costs, benefits and distributional effects of different alternatives. The

procedures to allocate rights and responsibilities would reflect the values and principles of the involved stakeholders, such as where the system stands in the scale of fully government regulated to the fully market regulated system, including also the absence or presence of an overall Water Law. Ideally, overall social objectives would be considered [such as meeting basic human needs, securing food supply, protecting the ecosystem, managing risks and valuing water.

Topics	Conceptualization
Trade-offs between social objectives	Agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives
Procedures to allocate rights and responsibilities	Government controlled? Market controlled? mixture?
Social objectives	How are the following focal points considered when trading off between social objectives: (i) meeting basic (human) needs; (ii) securing the food supply; (iii) protecting ecosystems; (iv) sharing water resources; (v) managing risks; (vi) valuing water; and (vii) governing water wisely

Table 7: Conceptualization of trade-offs between social objectives in water governance

Responsibility, authority, means

The discourse about responsibility and authority in relation to water management, according to **van Rijswick et al** (2014) starts with clearance of property rights in relation to water. In this context, property rights are meant as social relations that define the title holder in relation to all other actors and stakeholders. Further, which type of property water is, in the given country:

- private property, where the owner is an individual, or company;
- common property, where the owner is a group's, and others can be excluded;
- state (public) property, where the owner is the state, the administrator are state agencies, and everyone else can use the water according to the rules set by these agencies; or
- no property, where the water is not seen as a property, so access- and property-rights are not formally regulated.

In the classical set-up, the public domain would have authority at given administrative levels (local, municipal, county-level, or central government) to assign responsibility to actors and create means to empower such authority. Further, they note that in this context, *participative capacity* (means) of water structures refers to input structures of the policy process, while *integrative capacity* refers to intra-policy coordination, inter-policy coordination and external coordination to include non-governmental actors together with water policy institutions.

Dai (2015), explores the local water governance net from horizontal, vertical and interactive points of view, starting with institutional framework. She discusses different levels of government agencies, boards and commissions with their respective authorities and responsibilities. In order to evaluate the water governance structure, she considers fragmentation in arrangements and regulations, as well as coordination and communication between different actors. Further, vertical arrangements here refer to the authority structure of water governance bodies over each other, and whether that is a straightforward relation or a conflicting one. The plurality in actors in itself is not a positive or a negative trait, if there are effective coordinating mechanisms to produce policies that are not conflicting with each other.

Gupta, Ahlers, & Ahmed (2010) consider the question from a global perspective, starting from the fact that the problem of unmet water and sanitation service needs has been recognized by the UN General Assembly's resolution on the human right to water and sanitation (United Nations General Assembly, 2010). However, it does not clarify, whether

the consensus within the General Assembly implies that all governance actors accept the right and the responsibilities and does it override further governance discourses dominant in the global arena. The authors further consider what the challenges are in implementing such discourse and what the potential solutions can be, arguing that although there is growing consensus on the human right to water, fragmentation of water governance implies that the impact of the consensus is limited.

Gupta & Lebel (2010) argue about two aspects of distributional problems: access to basic resources; and, allocation of environmental resources, risks, burdens and responsibilities for causing problems. Also, addressing problems of access and allocation would often require access to social processes, such as science, movements and law. As a solution, the authors propose a multi-disciplinary perspective to address the problem of access and allocation.

Garrick, Bark, Connor, & Banerjee (2012) examined a reform process aimed at reallocating water from agriculture to the environment, involving local water managers within different governance arrangements. The authors examined prospects for a local role in environmental water management through the lens of the subsidiarity principle: the notion that effective governance devolves tasks to the lowest level with the political authority and capacity to perform them. They defined and applied the subsidiarity principle to assess interactions between various levels of government in environmental water policy, planning and practice. The results demonstrated opportunities for a local role in information gathering, innovation and operational flexibility to respond to opportunities in real time, while highlighting limits to local action in upstream-downstream trade-offs, economies of scale, capacity building and cost sharing, and accountability mechanisms to balance local, state and national rights and responsibilities.

Further considerations include whether there is a national water governance body tasked to provide safe drinking water and sanitation. Also whether, within regions or cities, there is a water governance body tasked to provide safe drinking water and sanitation. Further, how well organized authorities, responsibilities, means are to deal with water issues at the appropriate administrative scale(s) in a participative and integrative way (van Rijswick et al., 2014). Consideration is given to whether horizontal and vertical arrangements are regulated in relation to our focus issues, and if so, then how. Whether the official regulations are implemented, or, to what extent are they implemented, is also considered, as well as, whether there is a strong interconnecting web in place to encompass every aspect of water issues.

In conclusion, responsibility, authority and means aspect of the water governance would need to include a clear definition of water ownership, with both horizontal and vertical interaction between the involved bodies, including a national water governance body at the top, and local water governance bodies across the country. Ideally there would be minimal fragmentation in arrangements and regulations, but with efficient coordination and communication between the different actors. The processes would be carried out considering access to and allocation of the resources in an equitable way and ensuring that the issues are handled at the lowest level.

Topics	Conceptualization
Property rights in relation to water	How is water ownership defined? Public property, private property, no-good? (i) private property, where the owner is an individual, or company; (ii) common property, where the owner is a group's, and others can be excluded; (iii) state (public) property, where the owner is the state, the administrator are state agencies, and everyone else can use the water according to the rules set by these agencies; or (iv) no property,

Horizontal, vertical and interactive aspects of the water governance net	How do the different water governing bodies interact, how is the institutional set-up horizontally and vertically?
Water as a universal human right	How is the UN declaration on human rights implemented, if at all, to consider water as a human right?
Access and allocation	How is access provided to basic resources, who is responsible, how is the process regulated? How is the allocation of available resources decided upon (procedure) and what is the final outcome of the distribution?
Application of the subsidiarity principle	Are the information gathering, innovation and operational flexibility to respond to opportunities in real time handled in the local level?

Table 8: Conceptualization of responsibility, authority and means in water governance

Regulations and agreements

Regulations and agreements form the sixth building block in the assessment framework by **van Rijswick et al** (2014). Van Rijswick et al (2014) suggests that regulations and agreements can be evaluated based on their appropriateness, which depends on the actual circumstances, e.g. legal traditions, governmental organization, involved parties, relevant water system characteristics, actual water problem (if any) to be solved, and the intention of the participants. The first assessment criterion is legitimacy: if the rules and agreements are based on shared and agreed values, if they are in conformity with the law, if they offer legal certainty regarding rights, responsibilities and accountability, if they are effective and enforceable, whether the decision-making power is at the most appropriate level in the hierarchy, if the rules are transparent. Further, to take the distribution effect into account to avoid damage. Another aspect of regulations and agreements to consider is whether they are able to provide both a flexible and adaptable system in case a change is needed and at the same time certainty and enforceable protection, thus striking the right balance between flexibility and certainty.

Dai (2015), on the practical approach, discusses types of legal systems (common law / civil law/ traditional/ indigenous), and whether the environmental legislation that also covers water governance fit into this. She discusses the executive authority that enables the implementation of laws, and the hierarchy of the system. Further, the types of water quality objectives (narrative and numerical) that are in place, where narrative objectives are qualitative descriptions, numerical objectives include pollutant concentration limits, and other quantifiable limits and objectives. In addition to these, there are several water quality-related standards that are core standards for water quality management, as well as water pollution prevention and control strategies. The water pollution prevention and control strategies include an environmental impact assessment, water pollutant discharge permits, and discharge fees.

Swyngedouw (2005), considers the central and contradictory role of the state, in their collaboration with neoliberal strategies of dispossession and the details and implications thereof. Further, he discusses the continuing centrality of governing institutions in the organization and regulation of the water sector, and the weakened position of the citizen against these new modes of water governance.

Dore & Lebel (2010) argue that politics of deliberation, scales, and levels are crucial to understand the complexity of water-related governance. Deliberative processes might complement and inform more conventional representational and bureaucratic approaches to planning and decision-making, while being subject to scale and level politics can confuse institutionalized decision-making. Planned forms of engagement can be helpful as they enable different viewpoints to emerge and to articulate assumptions and reasoning about the

different opportunities and risks associated with alternative options, and in doing so, to enable conversations across the board. The authors find evidence that scale and level politics affect the context, process, content, and outcomes of deliberative engagement, particularly where there are sensitive and far-reaching choices to be made about water use and energy production.

Laurie & Crespo (2007) consider an area, that was managed by a large water multinational, that was frequently described internationally as an example of best practice. The authors focus on issues of social exclusion and network extension, contract negotiation, participation and transparency. They critique the failure of regulatory systems to promote accountability to the poor. Laurie & Crespo (2007) highlight the need for new mechanisms and delivery models to ensure greater national control over private companies and development of a framework for international water governance.

In conclusion, water governance regarding regulations and agreements would be legitimate, effective and enforceable, integrated into the legal system, with both narrative and numeric water quality objectives included in the water legislation that is part of the environmental legislation. These would provide both a flexible and adaptable system in case a change is needed as well providing as certainty and enforceable protection. The ideal regulations and agreements regarding water governance would be the result of deliberative processes, and include accountability to all members of society.

Topics	Conceptualization
Legitimacy Effectiveness and enforceability	Are the rules and agreements based on shared and agreed values? Are they in conformity with the law? Do they offer legal certainty regarding rights, responsibilities and accountability? Are they effective and enforceable? Is the decision-making power at the most appropriate level? Are the rules transparent? Do they take the distribution effect into account to avoid damage?
Legal systems integration	Which legal doctrine is the legal system based on – common law or civil law, maybe natural law or aboriginal law? How is the environmental law integrated into the legal system? Is the system a neoliberal market system or a pro-poor system, how well is it integrated?
Water quality objectives	What are the narrative, i.e. descriptive objectives included in the water legislation? What are the numeric, i.e. qualitative objectives included in the water legislation?
Deliberative processes	How are conversations planned? Are they planned forms of engagements or impromptu?

Table 9: Conceptualization of regulations and agreements in water governance

Financial arrangements

The seventh building block of the water governance framework developed by **van Rijswick et al (2014)**, is financing water management, as a way of empowerment, which is considered a crucial element. The authors suggest financing solutions according to three main principles. Firstly, cost recovery through a *solidarity principle*, referring to financing from national budget. Secondly, financing through a *profit principle*, meaning that whoever profits from water services would also need to pay proportionally. Finally, financing can be achieved

through the *polluter pays principle*, or other internationally agreed principles on environmental finance, as long as it is sustainable and equitable.

The importance of financial arrangements in mentioned by a number of authors, as one of the main factors leading to or holding back the achievement of water related MDGs, is financial funding (Awuah et al., 2009; Bogardi et al., 2012; Pahl-Wostl et al., 2007).

Dai (2015), when discussing the actual measures in financing water management, considers investment into environmental pollution control, and sourcing of such finance, which can be, as it is in China's case, the central government, as well as the fees the government collects to finance environmental pollution control, such as the taxes and levies on pollution. She further contemplates that economic incentives can offer flexibility and efficiency in achieving environmental policy goals.

Farrelly & Brown (2011) consider the widespread acceptance regarding the need to transition towards more sustainable urban water practices, and that supporting such a transition requires new frameworks to accommodate complexity and uncertainty. Further, it would need cultures that embrace experimentation and learning. They also examine the importance of and difficulty in undertaking experimentation in the urban water sector, and necessary mechanisms for influencing a step change to sustainable urban water management practices, when operating within a hierarchical and market-based governance system. They argue that industry conservatism and dominant risk-based management approach both operate as significant constraints to an experimentation culture, and are closely related to concerns about public health and financial implications.

Herrfahrdt-Paehle & Pahl-Wostl (2012) argue that recurring political, economic, and environmental crises require questioning and re-evaluating dominant pathways of development. They further consider that political and economic frameworks seem to encompass deeply rooted resistance to fundamental changes. E.g., global financial crisis, climate change negotiations. While there is an effort to repair the system fast, those same systems, mechanisms, and structures that led into the crisis are perpetuated. The authors suggest that crises could be used as an opportunity for learning, adapting, and entering onto more sustainable pathways. The authors draw on empirical research in South Africa and Uzbekistan, which were locked in persistent regimes over decades. Based on these case studies, Herrfahrd-Paehle and Pahl-Wostl illustrate the advantages and disadvantages of institutional continuity and change.

Garande & Dagg (2005) state that the concept of participation in rural development has been evolutionary for the past decades with development agencies and governments re-evaluating their active role. The move towards community participation has encouraged a shift from top-down to a bottom-up approach whereby there is a decentralisation of unevenly distributed resources and opportunity to empower a community and allow mobility of people participation. The project's objective was to implement a low technology, low budget water treatment plant in a village, however, various aspects have hindered the continued development, including both technical and financial.

Financial arrangements in relation to the management of drinking water and basic sanitation can be understood as the sum of all financial flows in the water management system between stakeholders.

Detailed conceptualization is derived from the responsibility aspect of it – national government's annual budget for this purpose from the budget, international organization's financing of local projects for this purpose, and cost recovery from the users' side, and

whether there any market forces present. Further, it should be considered whether the financial arrangements are sustainable and equitable, or, as a minimum, aim to be so.

In conclusion, financial arrangements regarding water governance, would need to consider a specific mixture of financing principles, including solidarity principle, polluter pays principle and profit principle, depending on the societal functions of the water system. It should also consider financing through taxes and environmental pollution fees, to emphasise the underlying values and principles on preserving nature. In an ideal water governance situation, the financing of the system through national government's annual budget for this purpose, to international organizations' financing and any other financing would cover the costs related to the operation of the water governance system. Further, such a water governance system would strike the balance between institutional continuity and flexible change.

Topics	Conceptualization
Financing principles of water governance	Which principle(s) does the water finance follow? Solidarity, profit, or polluter pays, or a mixture – if so, how is it decided which part is financed in which way?
Practical financing	Environmental pollution control – is it applicable? If so, how is it financed? Are there environmental taxes, if so, any of them aimed at water pollution?
Crisis financing	How does the country's current political and financial system react to a political/ financial crisis?
Financing flows	Are project financing top-down or bottom up, or something different?

Table 10: Conceptualization of financial arrangements in water governance

2.4 Implementation

Engineering and monitoring

The eights building block of the water management assessment framework, as developed by **van Rijswick et al** (2014) is focusing on engineering and monitoring. The engineering aspect refers to the infrastructure in place, e.g. the water pipes and sewage system, considering the principle of starting from a global design and then developing the more detailed plans and through to the implementation of such plans. Economic analysis is also a part of the engineering aspect of the framework: to assess the return on investment in constructing infrastructure, possible alternatives, and maintenance costs. The monitoring part concerns itself with whether the actual system fulfils the agreed SLAs, and if there is a monitoring system in place with available data.

Dai (2015), considers the programme on water infrastructure construction to meet the demand for water and to prevent flooding and drought. Further, she compares the country's per capita water resources to the global average, as well as the environmental monitoring system, both its administrative set-up and legal regulations that ensure that monitoring systems include reliable data.

Wiek & Larson (2012) consider the following aspects applicable to engineering and monitoring as part of the social-ecological system integrity principle: first, maintain or enhance the quality of water resources for ecosystems and humans by reducing pollution in water bodies. Second, ensure aquifers are not over-taxed to points of instability. Third, recognize and coordinate resource uses and impacts within physical units, to ensure social-ecological system integrity.

Halbe, Pahl-Wostl, Sendzimir, & Adamowski (2013) stress that innovative methods and tools are not sufficient for implementation, the concept needs to also be integrated in prevailing management system. The authors build on the management and transition framework (MTF) that allows for the examination of structures and processes underlying water management and governance. They combine participatory modelling and analysis of the governance system by using the MTF to investigate management paradigms, allowing for the transfer of knowledge between various stakeholders.

Green, Garmestani, van Rijswick, & Keessen (2013) start from the EU Water Framework Directive ("Directive") (European Commission, 2000). The Directive promotes sustainable water use through long-term protection of available water resources, progressively reduces discharges of hazardous substances into water. Striking the right balance between flexibility in local implementation and enforceable standards is essential, but achieving these goals simultaneously creates a unique difficulty. The authors analyse the Directive from the resilience perspective, highlighting key elements of modern European water management and their contribution to the resilience of the system and conclude that the potential lack of enforcement and adequate feedback of monitoring results does not promote managing for resilience. However, the scale-appropriate governance aspects of the EU approach promote adaptive capacity by enabling vertical and horizontal information flow, building local capacity, and delegating control at multiple relevant scales.

In conclusion, in an ideal world, the engineering and monitoring aspect of the water governance would need to correspond to the design developed, would need to meet the demand for water in a sustainable way, include an environmental monitoring system that provides reliable data, and adequate feedback of monitoring results. The system would need to integrate the innovative approaches into the system and striking a balance between enforceable standards and flexibility in implementation. Ideally the system would allow for maintaining or enhancing the quality of water sources, recognize and coordinate resource uses and impacts within appropriate physical units. Further, the system should allow for the transfer of knowledge between stakeholders.

Topics	Conceptualization
Design and implementation	How is the design and implementation of water infrastructure carried out? From global design to detailed design? How does it connect to the agreed SLAs?
Practical considerations regarding engineering and monitoring	Does the water infrastructure construction meet the demand for water? How is the environmental monitoring system set up, regarding both administrative set-up (number of tiers, branches, etc.) and the legal regulations that ensure that monitoring systems include reliable data?
Sustainability aspects of engineering and monitoring	Does the infrastructure help to maintain or enhance the quality of water resources for ecosystems and humans? Does it ensure aquifers are not over-taxed to points of instability, Does it coordinate resource uses and impacts within appropriate physical units, to account for interconnections between surface- and ground-water?
Including innovation in the engineering and monitoring	How are the innovative approaches integrated into the already existing system?
Enforceable standards vs flexibility in local implementation	Where is the balance in the engineering and monitoring between enforceable standards and flexibility in local implementation?

Table 11: Conceptualization of engineering and monitoring in water governance

Enforcement

The ninth building block in the **van Rijswick et al** (2014) water management assessment framework is enforcement. In order to close the policy cycle from participation, formulating goals, rules and standards and how to make decisions, enforcement is essential to ensure that goals are achieved. Lack of enforcement will make water management less efficient. Rules made based on shared values and principles would be easier to enforce as parties would have a strong conviction that they should behave in conformity with these rules (Buijze et al, 2014, Van Rijswick & Salet, 2012). Clear process norms and standards are considered as useful when it comes to enforceability. Further, there is a difference between public and private enforcement, in both cases, it is important to know the available remedies to achieve the objectives.

Dai (2015), considers the administrative and judicial channels of enforcement, considering also the need to train competent staff in both areas.

Green et al (2013), building on the recently introduced EU Water Framework Directive (European Commission, 2000) use applied resilience science to analyse the adaptive capacity of governance structures that include overlapping levels of control, information flow horizontally and vertically, meaningful public participation, local capacity building, authority to respond to changed circumstances, and robust monitoring, system feedback, and enforcement. Green et al (2013) conclude that the potential lack of enforcement and adequate feedback of monitoring results does not promote managing for resilience.

Boelens, Zwarteveen & Roth (2005) discuss how water management is characterized by competition between multiple uses and users, how the common wisdom treats as givens the river basin as a "natural" management unit, and water as an economic good. It is assumed that formulation and enforcement of national legal frameworks will facilitate a uniform implementation of such principles, and thus support water reform process. Yet these standardized approaches lack contextualized understanding that is needed to tackle complex problems. Between various levels of governance and management, water-related policy measures and interventions are questioned, reinterpreted, and transformed, while being influenced by the specific local system and its relations of power and control. The role of law in processes of water resources regulation is yet to be further exposed. The authors discuss recent trends in which interest in the analytical value of legal pluralism has become visible and which guides attempts to bring the social, legal, and policy worlds closer together.

McKay (2007) discovers that the government created organisations are the formal actors in the management of water and reports on work that aimed to examine the formal legal process after a water governance reform in Australia. She considers both formal organisations and the informal institutions that have different responses to the water law and policy changes. McKay concludes that responses of both formal organisations and informal institutions are instrumental to the success of the new water law and policy reforms.

In relation to the current topic, enforcement refers to the degree to which implementation of regulations and agreements are enforced, and considers whether regulations and agreements are enforceable; whether there are remedies or penalties available. Further, whether there are enforcement methods especially developed for the agreements, regulations on drinking water and basic sanitation, or whether they are derived from the overall legal system’s enforcement methods already in place. Finally, whether enforcement is available for both private and public parties.

In conclusion, in the ideal world, the enforcement aspects of the water governance would need to include a clear process, with available remedies as well as available feedback and

monitoring to feed into the enforcement process. The enforcement aspects would strike a balance between standardized enforcement across the scene as well as retaining the flexibility to consider local features with the balance being closer to a standardized enforcement pattern. There would be well-trained administrative and judicial staff to carry out the practical aspects of enforcement, and input from both formal and informal institutions.

Topics	Conceptualization
Theories of enforcement	Is there a clear process of enforcement? Is the available enforcement public or private enforcement? What are the available remedies?
Practical enforcement types	Is enforcement available to administrative channels? Or via judicial channels? Is there private enforcement available?
Feedback and monitoring	Is feedback and monitoring available, together with results in enforcement?
Diversity of enforcement	Is the enforcement across the country standardized or flexible to consider local features?
Formality	What are the formal and informal responses to policy changes in the current system?

Table 12: Conceptualization of enforcement in water governance

Conflict prevention and resolution

The tenth and final building block of the assessment framework by **van Rijswick et al** (2014) is conflict prevention and resolution. Conflict prevention includes the identification of potential economic, social and political benefits of cooperation. This view focuses on the value of water to show the advantages of benefit-sharing rather than water-sharing. From earlier building blocks, one can deduce that conflicts can best be prevented by having clear norms, standards, authorities, responsibilities, instruments and agreements. As possible options for conflict resolution, van Rijswick et al (2014), suggest mediation, arbitration or court proceedings, or via previously formulated mutually agreed conflict resolution processes.

Dai (2015), argues for strong monitoring system to prevent conflicts. As conflicts seemed to have been caused by economic competition and fragmented institutional structure, solving these would be a strong step towards conflict resolution. In other cases, one can also argue that finding the source of arising conflicts and solving that could be an efficient conflict resolution technique. Also, a stable and reliable judicial system in a country can be useful and efficient to solve conflicts.

Pacheco, Sanchez & Tattle (2012) discuss how conflicts still surface despite good water governance principles when there is insufficient water to meet needs or when competing demands of watercourse states clash with each other. Interdisciplinary solutions, drawn from social and technical fields, may encourage closer cooperation and conflict prevention. With the legal and operational context, the dynamic of information management and exchange in transboundary water governance, as well as its value in conflict prevention and fostering cooperation, can be better recognised.

Lecoutere (2011) examines how water governance in Tanzania works in a way that resource conflicts at local level have generally been avoided. Lecoutere (2011) observes processes in which actors involved in conflicts establish and re-establish institutions. The author show conflicts over water are solved in small-scale schemes, and how resource conflicts do not necessarily lead to violence, but motivate actors to pragmatically search for solutions via institutional pluralism that increases the potential for creativity. As such, Lecoutere argues, pragmatic conflict resolution and institutional pluralism contribute to the development of more sophisticated and locally adapted resource governance institutions.

Clanet & Ogilvie, (2009) examined farmers in the Volta Basin, in Ghana and argue that despite mutual benefits, farmers try to deny them access to water and thereby the possibility to graze their stock on crop residues making it a matter of local conflict resolution and good governance.

Further aspects of conflict prevention and resolutions include whether there are sufficient conflict prevention and resolution mechanisms in place (van Rijswick et al., 2014), if in the country there are mediators, arbiters or courts specialized in water governance. Connecting to earlier building blocks, "Values, principles, policies" can be considered to discuss whether water governance based on shared values. "Stakeholders involvement" to consider whether stakeholders were sufficiently involved in the regulation process as a way to improve conflict prevention and resolution. Finally, "Responsibility, authority, means", to consider whether there are clear regulations and agreements in place regarding conflict prevention and resolution.

In conclusion, in an ideal water governance situation, conflict prevention and resolution in relation to water governance would need to include previously formulated, mutually agreed conflict resolution processes, in a well-developed institutional set-up with clear rules and overall strong monitoring processes. Conflicts would be treated at the source, with a stable and reliable justice system with involvement of interdisciplinary solutions, with conflicts handled at the local level, ideally through a conflict resolution body that is specialized in water governance.

Topics	Conceptualization
Methods of conflict prevention and resolution	Are mediation, arbitration or court proceedings, or previously formulated mutually agreed conflict resolution processes used for conflict prevention and resolution?
Practical methods of conflict prevention and resolution	Are conflicts treated at the source? Is there a stable and reliable justice system to handle conflicts?
Interdisciplinary solutions	How are interdisciplinary solutions used in the case of water conflicts?

Table 13: Conceptualization of conflict prevention and resolution in water governance

2.5 Conclusion

In this chapter, we built on the framework of van Rijswick (2014), and developed the concepts of the ten building blocks further than the authors. Thus, my literature review added to the concepts of van Rijswick et al (2014) in a way that enriched the conceptualization of the ten building blocks with a focus on sustainable access to basic sanitation and safe drinking water in the following ten ways.

Firstly, to define whether there is sufficient knowledge of the existing water system in order to deliver the required service level of sustainable access to safe drinking water and basic sanitation. How to find gaps, if any, and how to assess whether there is sufficient knowledge available to assess the impact of changes in the environment or societal functions on the water system.

Secondly, whether there is sufficient knowledge of shared or conflicting values, viewpoints and principles (presented by different policy discourse coalitions) for water issues and their consequences for facing water management issues relating to the sustainable access to safe drinking water and basic sanitation.

Thirdly, whether all relevant stakeholders are involved in the policy making process. Whether their interests, concerns and values are sufficiently balanced and considered in the problem analysis, solution search process and decision-making.

Fourthly, whether the agreed service level decisions are based on trade-offs of costs, benefits and distributional effects of various alternatives.

Fifth, whether authorities, responsibilities and means are well-organized to deal with water issues at the appropriate administrative scale(s) in a participative and integrative way.

Sixth, whether regulations and agreements are legitimate and adaptive, and if not, what are the main problems with regard to legitimacy aspects.

Seventh, whether there is financial arrangement regarding sustainable access to safe drinking water and basic sanitation sustainable and equitable.

Eighth, whether SLAs are sufficiently available (implicit or explicit) in order to redesign the existing infrastructure. Whether the design and consequences of different alternatives are sufficiently available, together with sufficient monitoring of the system and with the data analysed.

Ninth, whether regulations and agreements are enforceable by public and/or private parties, and whether there are appropriate remedies available. Finally, whether there are sufficient conflict prevention and resolution mechanisms in place.

In the following chapter, *Methodology*, I will summarize various measurable aspects of these concepts, that helps with evaluation of each of these, i.e. operationalize them.

3 Methodology

3.1 Introduction

In the below chapter, I will operationalize the criteria developed in the earlier chapter, and discuss ways of data collection, in order to apply the operationalization to both the reference country, the Netherlands, as well as the focus country, Ghana.

3.2 Operationalization of criteria

In the below, I will summarize the criteria and the measurements along which I plan to operationalize the given aspects of water governance per topic. The measurements are mostly along the scale of:

+ exits, well developed, true, detailed, up-to-date;
0 exists, but not up-to-date; exists, but not well developed; neutral;
- does not exist; really outdated

Content

Criteria to evaluate water systems knowledge on	Measurement
Water systems knowledge includes per area of the lowest level of government involved (municipality) the focus area of the water system per societal function. I.e. industrial, agricultural or private use.	+/ 0/ -
An overview of the changes in recent decades per five-year periods to - the natural system – possible new or disappearing rivers or lakes; - the man-made infrastructure, - the changes that involve using the same infrastructure to other functions	+/ 0/ -
The actual amount or availability of - blue water and - green water, - virtual water flux is known per year.	+/ 0/ -
Demographical information and changes are known.	+/ 0/ -
A classification system is present that provides an overview of the quality of the available fresh water.	+/ 0/ -
Classification overview is updated regularly	+/ 0/ -
Resource units of water governance are known and communicated	+/ 0/ -
The same unit system is used across the country	+/ 0/ -
Quantitative knowledge of the water system includes - the number of rivers – with their water content, - the area of river basins, in standardized, comparable measure units, - volume of water resources, per both river basins, as well as per area of government	+/ 0/ -
Considering that the river basins and the governmental units may not overlap, an overview chart of these exists.	+/ 0/ -
A measure of sustainability is included in the system and is tracked throughout time	+/ 0/ -

Table 14: Criteria and measurement to evaluate water systems knowledge on.

Criteria to evaluate values	Measurement
There is a list of stakeholders available who are involved.	+/ 0/ -
A list of common interests is available that the stakeholders agree on.	+/ 0/ -
The goal to have sufficient and clean drinking water and basic sanitation to all is included in the water policy.	+/ 0/ -

Water policy includes measures, deadlines and other aspects of accountability.	+/ 0/ -
Sustainable and fair use is defined in the policy documents and included as a goal.	+/ 0/ -
The no harm principle is either explicitly or implicitly included in the water policy document(s), with an actionable plan on how to implement it.	+/ 0/ -
The available techno-scientific knowledge, as defined earlier, is be referred to when setting up water policy documents, together with the historical, cultural and socio-political aspects of water usage.	+/ 0/ -
Sustainable access to safe drinking water and basic sanitation is be considered as a universal human right, and is treated as such in the policy documents.	+/ 0/ -
The public view on the topic is clear and articulated via either a national poll, or other representative work.	+/ 0/ -
The country's ideology or religion is known, and has a clear attitude towards water as universal human right.	+/ 0/ -
Participation of stakeholders ensure that their input would reveal the underlying framings and values regarding water.	+/ 0/ -
Protection of human health and the environment is a priority, included in the constitution or other underlying basic legislation.	+/ 0/ -
The way water resources are allocated among societal functions clearly reflects the underlying value system.	+/ 0/ -
Water resources are explicitly protected.	+/ 0/ -

Table 15: Criteria and measurements to evaluate values on

Criteria to evaluate principles	Measurement
There is sufficient decentralization to be able to address water issues at the lowest possible level of government	+/ 0/ -
The system is integrated, proportionality is considered.	+/ 0/ -
Public participation is included in the policy process, together with environmental principles, such as prevention and polluter pays.	+/ 0/ -
Water governance is globally designed and from a big picture goal it would be further developed in detail	+/ 0/ -
Both actual and virtual water flows should be considered when discussing the whole of water governance	+/ 0/ -
The value of water is considered as a public good	+/ 0/ -
Boundaries to benefits and costs are defined.	+/ 0/ -
There is a proportional equivalence between costs and benefits.	+/ 0/ -
Outcomes should be emphasised in water policies, i.e. the goal to provide sustainable access to safe drinking water and basic sanitation.	+/ 0/ -
The governance structure is set up in a way that arising issues can be tackled at the source.	+/ 0/ -
There is a clear system of how issues are escalated, if need be.	+/ 0/ -

Table 16: Criteria and measurements to evaluate principles on

Criteria to evaluate policy discourses on	Measurement
All viable courses of action, viewpoints and contents are considered in a policy discourse	+/ 0/ -
Frame and perception are analysed in relation to what government communications reveal about policy discourses.	+/ 0/ -
Voices of women and the poor, and any other marginalized groups are included in the water policy discourse, via formal or informal methods.	+/ 0/ -
Underlying qualities of openness, transparency, broad participation, predictability, ethics and integrity are included in water policies	+/ 0/ -
There are regular studies to check that these voices are included on an ongoing basis	+/ 0/ -

Table 17: Criteria and measurements to evaluate discourses on

Criteria to evaluate stakeholders' involvement	Measurement
Most groups of the society are included in the decision making progress.	+/ 0/ -

All citizens with voting right are able to have a say, - directly (in a national poll) or - via representatives (via selected foremen).	+/ 0/ -
There exists an overview of the groups, and a transparent overview of the decision making process, including standpoints in the beginning, result in the end, to double check which groups to what degree can influence the final outcome.	+/ 0/ -
Stakeholder involvement can be both command-control or flexible, in relation to water governance issues, there was no clear preference to either, so in an ideal situation, it can be both, as long as the type of involvement and its depth is clear from the beginning.	+/ 0/ -
The methods of stakeholder involvement include expert panels, public hearings, written statements and via follow-up from the commission.	+/ 0/ -
The Aarhus Convention's aspects, i.e. (1) access to information, (2) participation in decision making and (3) access to justice, Are all available, and more explicitly, access to information is wide, easy and transparent,	+/ 0/ -
Public is informed over all the relevant projects and can choose to participate in it.	+/ 0/ -
The public has the right to recourse procedures.	+/ 0/ -
The aim of stakeholder involvement is clearly defined	+/ 0/ -
Stakeholder involvement includes, among others, building knowledge, and involvement in water management.	+/ 0/ -
The scale and level contests are clear and transparent, and both privilege the environmentally most friendly choice.	+/ 0/ -

Table 18: Criteria and measurements to evaluate stakeholders' involvement on

Organization

Criteria to evaluate trade-offs	Measurement
The agreed service-level decisions are based on trade-off of costs, benefits and distributional effects of the alternatives.	+/ 0/ -
Allocating rights and responsibilities in the case of water governance is a mixture of government and market control, where governmental influence both sets the course and the overall goal, and provide opportunities for the market to act in a way to fulfil those objectives.	+/ 0/ -
In a water governance discussion, the social objectives around meeting basic human needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely, are all considered,	+/ 0/ -
When focusing on sustainable access to safe drinking water and basic sanitation, these are given more significant weight.	+/ 0/ -

Table 19: Criteria and measurements to evaluate trade-offs on

Criteria to evaluate responsibility, authority and means	Measurement
Property rights in relation to water are defined, most likely as a public good.	+/ 0/ -
There is a clear institutional set up for interaction between bodies both horizontally and vertically.	+/ 0/ -
The UN declaration on human rights is implemented, and it is stated in policy that access to water is considered a basic human right.	+/ 0/ -
Access is provided based on a democratic decision-making process	+/ 0/ -
The process is regulated with a wide involvement of stakeholders in a transparent and democratic manner	+/ 0/ -
Information gathering, innovation and operational flexibility to respond to opportunities in real time is ideally handled in the local level.	+/ 0/ -

Table 20: Criteria and measurements to evaluate responsibility, authority and means on

Criteria to evaluate regulations and agreements	Measurement
The rules and agreements are based on shared and agreed values	+/ 0/ -

The rules and agreements are in conformity with the law.	+/ 0/ -
The rules offer legal certainty regarding rights, responsibilities and accountability.	+/ 0/ -
The rules are effective and enforceable.	+/ 0/ -
The decision-making power is at the most appropriate level – which is different for each water-related issue, but mostly, each issue is handled at the lowest level of government and escalated appropriately, if needed.	+/ 0/ -
The rules are transparent, and they take the distribution effect into account to avoid damage.	+/ 0/ -
The legal system is clearly based on a legal doctrine.	+/ 0/ -
The environmental law is well integrated into the legal system, with a pro-poor lens.	+/ 0/ -
Descriptive water objectives are included in the water legislation.	+/ 0/ -
Qualitative, or numeric objectives are included in the water legislation.	+/ 0/ -
Deliberative processes are planned, on a regular basis.	+/ 0/ -

Table 21: Criteria and measurements to evaluate regulations and agreements on

Criteria to evaluate financial arrangements	Measurement
A mixture of solidarity, profit and polluter pays principles plays part in the water governance, with a clear and transparent decision making process leading to the actual mixture that is used in financing for this purposes.	+/ 0/ -
Environmental pollution control is in place; it is based on the polluter pays principle.	+/ 0/ -
Environmental taxes are also in place as a financing method.	+/ 0/ -
Crisis financing in relation to water governance is rather hard to grasp in relation to sustainable access to safe drinking water and basic sanitation, however, a crisis financing plan is in place.	+/ 0/ -
Project financing is top-down, including the option to drive projects with private financing from bottom-up within the framework.	+/ 0/ -

Table 22: Criteria and measurements to evaluate financial arrangements on

Implementation

Criteria to evaluate engineering and monitoring	Measurement
The design and implementation of projects is from global design to detailed design.	+/ 0/ -
The design and implementation correspond to the agreed SLAs.	+/ 0/ -
The water infrastructure meets the demand for water.	+/ 0/ -
There is an environmental monitoring system set up to ensure that the monitoring systems provide relevant and reliable data.	+/ 0/ -
The infrastructure helps to maintain or enhance the quality of water resources for ecosystems and humans, and it ensures that aquifers are not overtaxed to points of instability.	+/ 0/ -
The engineering and monitoring aspect coordinates resource uses and impacts within appropriate physical units.	+/ 0/ -
Innovative approaches are considered and integrated into the already existing system.	+/ 0/ -
There is a balance, that is accepted by the stakeholders, between enforceable standards and flexibility in local implementation.	+/ 0/ -

Table 22: Criteria and measurements to evaluate engineering and monitoring on

Criteria to evaluate enforcement	Measurement
There is a clear process of enforcement	+/ 0/ -/
The available enforcement is available to everybody, and it can be both public or private, depending on the country's underlying cultural values.	+/ 0/ -
There are appropriate remedies available, where appropriate is defined by what the stakeholders deem as appropriate based on the underlying common values.	+/ 0/ -
Enforcement is available via both administrative, judicial and private channels.	+/ 0/ -
Feedback and monitoring are available together with the results for enforcement.	+/ 0/ -
Enforcement across the country are mainly standardized with certain flexibility to consider local features – in a way that most stakeholders would agree, based on common values.	+/ 0/ -
There are formal and informal feedback responses to policy changes that the current system would need to take into consideration as a feedback for improving the system.	+/ 0/ -

Table 23: Criteria and measurements to evaluate enforcement on

Criteria to evaluate conflict prevention and resolution	Measurement
All the following methods are accepted for conflict prevention and resolution: - mediation, - arbitration or - court proceedings, or - previously formulated mutually agreed conflict resolution processes.	+/ 0/ -
Conflicts are primarily treated at the source, with a clear process on when and how to escalate them if needed.	+/ 0/ -
There is a stable and reliable justice system to handle conflicts.	+/ 0/ -
Interdisciplinary solutions are used in the case of water conflicts, where applicable.	+/ 0/ -

Table 24: Criteria and measurements to evaluate conflict prevention and resolution on

3.3 Data collection

Desk research

The research strategy was to conduct a **desk research** of a.) the separate building blocks of van Rijswick et al's (2014) assessment framework to come up with individual indicators and conditions with regard to the special case of sustainable access to safe drinking water and sanitation within the wider area of water governance and management; and b.) consider these individual indicators in the case of the benchmark country, the Netherlands, and then c.) based on the first part, to follow up looking into these aspects of water governance and management with regard to Ghana, the focus country.

Using desktop research usually helps to provide in depth insight into the specific part of water governance and management focusing on sustainable access to safe drinking water and basic sanitation, as well as the available information on these topics. This applies with regards to both the benchmark country, the Netherlands, and the focus country, Ghana, thus making use of existing materials further than what it was originally generated for, while gaining a more objective picture of the situation than what is usually the case when conducting a case study or an interview.

The desk research also included research in local sources, such as newspapers, and other sources in Ghana, where applicable as well as available information on international NGOs and other actors' activities in Ghana.

Naturally, I kept in mind that the available literature was most likely written with a different research goal than my current research goal (Driessen, 2015; Verschuren & Doorewaard, 2010).

A desktop research was thus conducted on

- Available scientific literature on water governance and management with regard to sustainable access to safe drinking water and basic sanitation in order to find criteria and indicators for each of the ten building blocks (van Rijswick et al., 2014).
- The specific indicators and criteria as discovered above, as applicable in the case of the Netherlands and in Ghana.

I used Scopus and Google Scholar as preferred search engines, and filtered my results based on relevance as defined by the number of citations of each result.

Semi-structured interviews

Once the desk research was completed, further, more practical information regarding the topic was planned to be gained based on semi-structured interviews with the identified and

available stakeholders, in order to verify and adjust my findings that were developed based on the literature review. This type of research is an excellent supplement to desktop research to reach the above stated goal of refining the findings, as it does not require extensive previous research experience, while enabling researchers to come to significant findings, while making also use of earlier acquired interview skills (Driessen, 2015; Verschuren & Doorewaard, 2010).

In order to get the most relevant input on the practical aspects of the two countries water governance, I contacted NGOs active in Ghana (*Appendix I*), as well as relevant LNGOs, such as EDSAM Social Network, a local NGO with the Ghana WASH Project (Ghana WASH Project, 2015) Ghana Coalition of NGO's in the Water & Sanitation Sector (CONIWAS) (Ghanayello, 2015), representatives from relevant international NGOs, such as ActionAid; Catholic Relief Services; SafeWaterNetwork; Wateraid.org; WHO-Unicef Joint Monitoring Programme; and local government representatives, from the Ministry of Agriculture, Ministry of Water Resources, Works and Housing (Government of Ghana, 2015b). Unfortunately, contacts from these organizations were not responsive.

As the availability of interview subjects with a helicopter view and deep expertise in all aspects of the ten building block approach would have been highly unlikely to be found (if at all), I decided to consider experts in each area individually, to cover the relevant aspects of each building block, each adding up to the completeness of the picture, and planned on using the snowballing strategy. As such, I reached out to people with relevant papers on different aspects of Ghanaian water governance (*Appendix II*); the individuals and organizations active in water governance in the Netherlands (*Appendix III*), and respected research engines, such as *Scopus* and *Google Scholar*.

The questions to be answered on the different aspects can be found in *Appendix IV* (questions on Ghanaian water governance) and *Appendix V* (questions on Dutch water governance). Considering the non-responsiveness of the interview subjects, I did not gain sufficient data from these questionnaires to use for my thesis.

Data analysis

The data was analysed based on the available desk research, considering the operationalization included in *Chapter 3.1. Operationalization of criteria.* First, I researched and operationalized aspects of the Dutch water governance practice, which, for the purposes of this research, I considered and used as an etalon to measure the Ghanaian water governance against to. Secondly, I researched and operationalized aspects of the Ghanaian water governance along the same scale. Thirdly, I compared the two country's results in order to identify strengths and weaknesses of the Ghanaian water governance, and drawing on examples of the Dutch water governance, to arrive at possible recommendations on how to strengthen possible weak spots in Ghanaian water governance.

In conclusion, after the initial introduction on the research framework and the knowledge gap to address, in Chapter 1, and the conceptualization of the framework more elaborately, in Chapter 2, in this chapter, the methodology was addressed, including the operationalization of the criteria, and methods of data collection and analysis. In the following chapter, the reference country, the Netherlands, will be described based on the developed criteria.

4 Good water governance in the Netherlands?

4.1 Introduction

In the earlier chapters, the water governance framework of van Rijswick et al (2014) was conceptualized (Chapter 2) then operationalized (Chapter 3), and as a next step, in this chapter, the reference country, the Netherlands will be assessed. This assessment was based on the developed criteria and on a literature review.

4.2 Content

Water system knowledge

Criteria to evaluate	Score for the Netherlands
Water systems knowledge includes per area of the lowest level of government involved (municipality) the focus area of the water system per societal function. I.e. industrial, agricultural or private use.	+
An overview of the changes in recent decades per five-year periods to - the natural system – possible new or disappearing rivers or lakes; - the man-made infrastructure, - the changes that involve using the same infrastructure to other functions	0
The actual amount or availability of - blue water and - green water	+
Demographical information and changes are known.	+
A classification system is present that provides an overview of the quality of the available fresh water.	+
Classification overview is updated regularly	+
Resource units of water governance are known and communicated	+
The same unit system is used across the country	+
Quantitative knowledge of the water system includes - the number of rivers – with their water content, - the area of river basins, in standardized, comparable measure units, - volume of water resources, per both river basins, as well as per area of government	+
Considering that the river basins and the governmental units may not overlap, an overview chart of these exists.	+
A measure of sustainability is included in the system and is tracked throughout time	+

Table 25: Results on water systems knowledge in the Netherlands

The societal function of the water system can be divided between industrial, agricultural and private use. In the case of the Netherlands, all three are covered under the Ministry of Infrastructure and Environment, and are split by areas of policy, implementation and compliance. In the policy section, three Directorates-General are concerned with developing policy in the areas of mobility, water management, aviation and maritime affairs, spatial planning and the environment. The Directorate-General for Public Works and Water Management (Rijkswaterstaat, RWS) ensures that policy is implemented. Human Environment and Transport Inspectorate (ILT) oversees compliance with statutory regulations by private individuals and companies. The Royal Netherlands Meteorological Institute (KNMI) gathers information on the weather, climate and seismology and performs research. (Ministry of Infrastructure and Environment, 2016b). The Dutch Water Authorities Act states that "*local and regional responsibilities for water management and public works should be carried out, also in the future, by bodies, which are specialized in those duties, that is to say the regional water authorities*" (van Rijswick & Havekes, 2012).

River basin district	Total – All NACE activities	Agriculture forestry and fishing	Industry and construction	Services	Households
	(million m^3)	(% of total)			
Schelde / Escaut (BE) ([2])([3])	1,387	2.4	87.8	6.8	2.9
Danube (BG)	2,941	0.4	94.3	0.8	4.5
East Aegean (BG)	1,661	19.6	75.1	1.1	4.3
Labe/Elbe (CZ)	1,285	1.8	74.9	8.3	15.3
Danube (DE)([2])	3,865	0.0	88.1	0.2	11.7
Rhine (DE) ([2])	15,937	0.3	89.0	0.2	10.5
Weser (DE) ([2])	5,491	0.9	91.7	0.1	7.3
Elbe/Labe (DE) ([2])	4,635	1.9	82.9	0.3	14.9
Thessalia (EL)	1,318	93.1	0.0	0.0	6.9
Central Macedonia (EL)	1,339	89.00	2.7	0.6	7.7
Cyprus (CY) ([2])	1,300	3.7	90.0	0.0	6.3
Ems (NL) ([2])	1,764	0.4	98.2	0.1	1.3
Maas/Meuse (NL) ([2])	3,634	1.8	93.6	0.4	4.2
Rhine (NL) ([2])	7,777	1.1	90.7	0.7	7.5
Schelde/Escaut (NL) ([2])	1,629	0.2	98.2	0.1	1.5

(1) Based on available information: main river basin districts > 1 billion m^3 of water
(2) 2010
(3) Brussels and Flemish region. Source: Eurostat (online data code: env_wateruse_rb)

Table 26: Water use by river basin district in the Netherlands (Eurostat, 2016)

Further details on the industrial use of water are available, including mining, manufacturing, energy production and construction, across Europe, and also regarding the Netherlands. (European Commission, 2016). Also, a different overview of water use by economic sectors, i.e. agriculture, and forestry, industry and construction, services, and households (European Commission, 2015). The data per municipality on the different societal functions, is, however, not readily available.

Changes in the function of the water use may be found at the EU level, but data is not readily available on the country level. An overview of water management in the Netherlands is available (Rijkswaterstaat Water, 2011).

Changes in the natural water system are mostly due to both human induced changes that led to climate change, as well as the infrastructural changes which aim to be improved for the general population's betterment. The projected changes based on the OECD estimates are that increase in precipitation (and decreasing contribution of snow) in winter will contribute to higher discharges in the flood basin of the Rhine and Meuse. Increase in freshwater demand in summer will occur due to higher temperatures and evaporation (very likely). There will be greater penetration of saline water into surface water bodies (very likely). There is a potential salination of groundwater resources (likelihood unknown). There will be decrease in levels of surface water and groundwater in the summer. Insufficient water quality will occur, especially due to non-point source pollution, as well as longer periods of drought. Existing unique ecosystems will be under threat. Increase in salination also constitutes a threat to existing species. However, changes also offer opportunities for new species (OECD, 2013).

The supply of fresh water can be divided into two areas, namely: surface and groundwater. The surface water resources are mainly from river systems draining the country. The overview of the water supply can be seen in the below chart by Vewin:

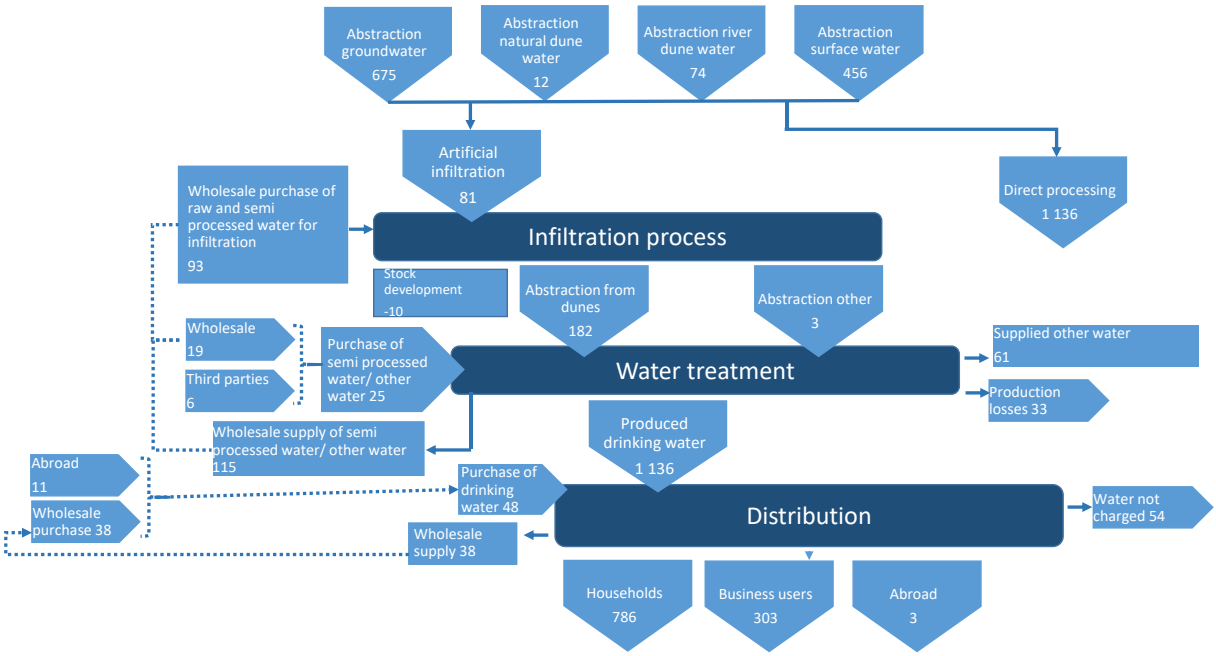

Figure 4: Water balance 2010 in millions m^3/year, in the Netherlands (Tobergte & Curtis, 2013a)

The water supply is mapped out based on the basin system, covering the Ems, Meuse, Rhine and Scheldt river basins, as is required by the WFD. Further it also assigns groundwater to the river basins, and the sea is also under the scope of the Water Act (van Rijswick & Havekes, 2012). The water supply is further categorized into sub-basins, Ems, Meuse, Central Rhine, Northern Rhine (Groningen, Drenthe, Nedereems and Fryslan), Easter Rhine, Wester Rhine and Scheldt, and the water management is organized around these sub-basins (ibid). The Netherlands have 4 river basin districts, out of which 4 are international sharing water courses with Belgium, France, Luxemburg, Germany (Water Information System for Europe, 2016).

Figure 5: Netherlands WFD River Basin Districts (Water Information System for Europe, 2016)

The area of these basins are as follows:

River basin	Total drainage area (km^2)	Dutch area (in km^2)
Ems	18,000	2,600
Meuse	36,000	7,700
Rhine	186,000	31,700
Scheldt	22,000	3,200

Table 27: Overview of the area of Dutch river basins (Rijkswaterstaat Water, 2009)

The demand for water changes according to the population size, which has an estimated growth of 0.3 percent annually, and standing at 16.7 million people in 2012. (van Rijswick & Havekes, 2012; World Bank, 2016c). Approximately 89% of the total population lives in urban areas (World Health Organization, 2016).

The quality of fresh water is measured against the WFD (European Commission, 2000), and the different river basins are monitored according to their compliance in percentage (Tobergte & Curtis, 2013a). The resource units used in water governance and exploratory field searches are measured in millions of m^3.

The quantitative water system knowledge, covering the number of rivers, area of river basins, have been mentioned earlier, together with the volume of water resources. As for the geographical distribution of water resources, it can be deduced from the above. Water quality overview is discussed in the Draft National Water Plan (2015), where it states that the Water Quality Objectives and Monitoring Decree 2009 stipulates the quality requirements that reflect the good condition of the bodies of water. The national measures operate through the source-oriented track. For all sources of contamination, licences or general rules prescribe the best available techniques to reduce discharges and emissions. Subsequently, the need for any additional measures will be assessed. The substances and figures included in the Water Quality Objectives and Monitoring Decree and underlying Ministerial Monitoring Regulation may serve as the starting point for both the Water Framework Directive waters and other waters. The Water Management Laws and Regulations Handbook discusses the manner in which substances not provided for in the law can be dealt with. These substances also include the so-called ‘very alarming substances’ (Noordzeeloket, 2009).

Ecological aspects, such as indicators of sustainability are included in such way that water quality standards in relation to emission of dangerous substances are usually regulated in the Netherlands in a way that the emission threshold values were included in the permit conditions (van Rijswick & Havekes, 2012). Since the WFD took effect, the Water Act aims, amongst other things, at the protection and improvement of the chemical and ecological quality of water systems, referring also to the Environmental Management Act (*Wet Milieubeheer*) (van Rijswick & Havekes, 2012).

As for the criteria defined above, in the Netherlands, the readily available water systems knowledge does include the lowest level of government involved, and is described in detail below:

Government bodies	Rhine	Meuse	Scheldt	Ems
Water boards	18	7	3	2
Provinces	10	4	3	2
Municipal councils	305	121	20	24
Central	1	1	1	1

government (VenW (incl. RWS3), LNV and VROM)				

Table 28: Number of government bodies in the Netherlands involved in each river basin (Rijkswaterstaat Water, 2009)

The focus area of the water system per societal function is available, focused on the country as a whole, and the regional waterboards do have some overview data available (Rijkswaterstaat Water, 2015). Some information is available on the changes in recent times, in an organized, methodical way. Information about the availability of blue water, green water and virtual water flux are available and well documented. As for the demographical changes, as population change is considered a significant influence on the pressure on the water system, there is data available on population change over the years. A classification system is present, but it does not apply a five scale system, rather a percentage-based overview of how aligned the given water source is with the given criterion. Whether the water in the different water basins, or smaller geographical unit is classified based on this classification system is yet to be seen. The water quality in the country is recorded in accordance with the WFD. Water is measured in m^3. Quantitative knowledge of the water system does include the number of rivers – with their water content, the area of river basins, in standardized, comparable measure units, volume of water resources, per river basins, and per area of water government unit. The Netherlands does have a very strong water governance system, with their individual maps and overviews. Also, considering the sustainability of the system, ideally there would be included a measure of sustainability – and tracked throughout time, so far, I have not found a historical overview of the water-related environmental issues.

Values, principles, policy discourses

Values

Criteria to evaluate values	Score for the Netherlands
There is a list of stakeholders available who are involved.	+
A list of common interests is available that the stakeholders agree on.	+
The goal to have sufficient and clean drinking water and basic sanitation to all is included in the water policy.	+
Water policy includes measures, deadlines and other aspects of accountability.	+
Sustainable and fair use is defined in the policy documents and included as a goal.	+
The no harm principle is either explicitly or implicitly included in the water policy document(s), with an actionable plan on how to implement it.	+
The available techno-scientific knowledge, as defined earlier, is be referred to when setting up water policy documents, together with the historical, cultural and socio-political aspects of water usage.	+
Sustainable access to safe drinking water and basic sanitation is considered as a universal human right, and is treated as such in the policy documents.	+
The public view on the topic is clear and articulated via either a national poll, or other representative work.	+
The country's ideology or religion is known, and has a clear attitude towards water as universal human right.	+
Participation of stakeholders ensure that their input would reveal the underlying framings	+

and values regarding water.	
Protection of human health and the environment is a priority, included in the constitution or other underlying basic legislation.	+
The way water resources are allocated among societal functions clearly reflects the underlying value system.	+
Water resources are explicitly protected.	+

Table 29: Results on values in the Netherlands

Common interests in relation to water policy stem, in the Netherlands, from the fact that the country is a delta in a low-lying area, with many transboundary rivers, groundwater bodies and other waters on its area. About 18% of the country consists of surface water in the shape of various forms, such as rivers, pools, lakes, streams, canals, etc. (van Rijswick & Havekes, 2012). The Netherlands, being part of the European Union, the OECD, and the UN, and being signatory to their agreements, supports the common interests formulated in those agreements.

A list of involved stakeholders as such is not available. However, in the water board elections, everybody who is an EU citizen and lives in a given municipality can vote, thus involving relevant stakeholders in the decision making process. The OECD report on Dutch water governance, “Fit for the future?” builds on a one-year policy dialogue with over 150 Dutch stakeholders, supported by robust analytical work and international best practice (OECD, 2014).

The value to have available sufficient and clean drinking water and basic sanitation is included in the Water Framework Directive, and in the Drinking Water Directive (Directive 98/83/EC), which derive it from the general principles of EU law, the EU charter of Fundamental Rights and the European Convention on Human Rights (ECHR). Further, these directives also have the double scope of protecting human health and protecting the environment.

The value of sustainable and fair use and that of the no harm principle can be derived from Article 21 of the Constitution: “it shall be the concern of the authorities to keep the country habitable and to protect and improve the environment” (van Rijswick & Havekes, 2012).

From this, we can deduct that the availability of sufficient and clean drinking water and basic sanitation to all is one of the underlying values. The no harm principle and the sustainable and fair use of resources are embedded in the overall regulation (Ministry of the Interior and Kingdom Relations, 2008).

Considering the universal approach, water policy seems to focus on both the techno-scientific background, considering the natural water systems as well as the socio-political aspects of health, safety and general human well-being considered for water policy, thus the universal approach can be detected (Ministry of the Interior and Kingdom Relations, 2008; Rijkswaterstaat Water, 2009).

Regarding water as universal human right, as the Netherlands was a member of the UN at the time its general assembly declared access to water and basis sanitation a human right, it is safe to say that this is also true for the Netherlands. (United Nations, 2010)

Water is seen in the Netherlands not as a commercial good, but rather as a heritage, a treasure to be protected, and is handled as such (van Rijswick & Havekes, 2012, p28).

Regarding the public view on water, as about 26% of the country lies under sea level, water is an important aspect of Dutch life, with water boards as water governing bodies being

established as early as the 13th century (van Rijswick & Havekes, 2012). Elections of officials to water boards happen every four years, by registered inhabitants of the given area who are over 18 years old. Thus, the water governance of the given governance unit could be said to represent the views of its stakeholders.

The country's underlying ideology is a parliamentary representative democracy, a constitutional monarchy, and an independent unitary state, with an aim to reach broad consensus on important issues (Ministry of the Interior and Kingdom Relations, 2008).

Principles

Criteria to evaluate principles	Score for the Netherlands
There is sufficient decentralization to be able to address water issues at the lowest possible level of government	+
The system is integrated, proportionality is considered.	+
Public participation is included in the policy process, together with environmental principles, such as prevention and polluter pays.	+
Water governance is globally designed and from a big picture goal it would be further developed in detail	+
Both actual and virtual water flows should be considered when discussing the whole of water governance	+
The value of water is considered as a public good	0
Boundaries to benefits and costs are defined.	0
There is a proportional equivalence between costs and benefits.	+
Outcomes should be emphasised in water policies, i.e. the goal to provide sustainable access to safe drinking water and basic sanitation.	+
The governance structure is set up in a way that arising issues can be tackled at the source.	+
There is a clear system of how issues are escalated, if need be.	+

Table 30: Results on principles in the Netherlands

The Dutch water law can be reviewed under the umbrella of the European water law. In European water law, principles play a rather important part, including the principles of subsidiarity and proportionality, which govern the exercise of Union competence (Art. 5 TEU, (European Union, 2008). The subsidiarity principle also plays an important role.

In the National Water Plan, given its responsibility for the water system, the central government is embedding the following principles:

- Comprehensive water management, the Cabinet continues to maintain a comprehensive approach to the water challenges, by considering the various tasks relating to water quantity (flood risk management and pluvial flooding), water quality and use of (fresh)water under wet and dry circumstances in relation to one another.
-
- Preventing shifting The Cabinet wants to prevent water quantity and quality problems being shifted in terms of space and time. That is, quality problems caused upstream should not be shifted to downstream waterways. To prevent this shifting, managers are reaching agreements with each other about acceptable quantities and the quality of the incoming water. To this effect, the following sequences apply:
-
    - Retain-store-discharge. This sequence means that water is retained in the soil and as surface water for as long as possible to prevent pluvial flooding and inundations and, during dry periods, to retain local water for as long as possible. If necessary, water will be stored temporarily. If retention and storage are no longer possible, the water will be discharged elsewhere. This sequence prevents responsibility for the regional water system being shifted

to the main water system. Based on this sequence, Rijkswaterstaat is reaching agreements with regional managers on the discharge of water from the regional to the main water system.
    - Keep clean-separate-clean. The main purpose of this sequence is to keep the water as clean as possible. Secondly, clean and contaminated water must remain separated as much as possible. Finally, if keeping clean and separation are no longer possible, cleaning the contaminated water may be the next step (prevention ladder in the Drinking Water Policy Document).

- Connecting space and water. In addressing water challenges and implementing measures, the activities are first coordinated with the other relevant spatial tasks and measures in the area. The aim is to ensure the best possible harmonisation or mutual reinforcement of the scope, programming and financing. This approach often makes it possible to improve water management, while at the same time reinforcing the economy and the living environment at lower costs. 9 The Cabinet has adopted the following principles in implementing this National Water Plan: - Adaptive approach. The water partners will anticipate future developments on the basis of an adaptive approach, through phased decision-making, flexible strategies and a comprehensive approach. This will minimise the probability of overinvestment or underinvestment. This approach makes it possible to take effective measures in the short term that can be adapted to new insights or developments in the long term.

- Collaboration. The Cabinet sets great store by close collaboration with government authorities and stakeholders, based on a relationship of trust, transparency and equivalence.

- Inform-encourage-act. Water users may expect the following roles from the government: government authorities inform users and encourage them to assume responsibility and take measures for themselves (Noordzeeloket, 2009).

Issues are first addressed at the local water board level, the Dutch Water Boards play a key role in environmental management in the Netherlands because they are responsible for managing and maintaining surface water quantity and quality throughout the country. One of the oldest public authorities in the Netherlands, the 26 Water Boards operate quite independently of national government in their primary task of safeguarding the country against flooding and rising sea level. The water boards are responsible for managing and maintaining flood defences along the coast, rivers and waterways (Dutch Water Authorities, 2016). An integral part of this task is to manage and maintain sufficient quantity of surface water of adequate quality for various purposes – drinking water, domestic and industrial uses. This includes managing and operating municipal wastewater treatment plants and the discharge of treated water into surface waters. It involves continuous monitoring of the chemical and biological quality of surface waters (Government of the Netherlands, 2016b).

Regarding the polluter pays principle, the Dutch National Water Plan includes this principle as a way forward to finance water management in the future (Government of the Netherlands, 2016b; Noordzeeloket, 2009).

The water system design is global designed focused, starting out with the National Water Plan (NWP), water management being the joint responsibility of the central government, provinces, municipalities and water boards. Collaboration is an important prerequisite for effective action. The river basin management plans , the Flood Protection Programme, the flood risk management plans, the Administrative Agreement on Water and the Delta

Programme are all examples of programmes and plans which, together, are energetically tackling water challenges (Noordzeeloket, 2009).

Water in the Netherlands is regarded as a national heritage, thus, most likely, a public good, governed by the water boards in the given provinces, or areas covered by the water boards, also, certain aspects of it are considered as private goods, with drinking water companies being involved in it (Noordzeeloket, 2009).

Environmental protection is considered in many ways, including the existence of the Ministry of Infrastructure and the Environment, which is committed to improving quality of life, access and mobility in a clean, safe and sustainable environment. The Ministry strives to create an efficient network of roads, railways, waterways and airways, effective water management to protect against flooding, and improved air and water quality (Ministry of Infrastructure and Environment, 2016b).

The Dutch legislature believes that there is no need to include principles in the national legislation, because this inclusion would be purely symbolic, thus not taking into consideration that amid changing environment and changing natural processes, inclusion of principles in the legislation could provide a highly valuable guidance to legislators (van Rijswick & Havekes, 2012).

Policy discourses

Criteria to evaluate policy discourses on	Score for the Netherlands
All viable courses of action, viewpoints and contents are considered in a policy discourse	+
Frame and perception are analysed in relation to what government communications reveal about policy discourses.	+
Voices of women and the poor, and any other marginalized groups are included in the water policy discourse, via formal or informal methods.	+
Underlying qualities of openness, transparency, broad participation, predictability, ethics and integrity are included in water policies	+
There are regular studies to check that these voices are included on an ongoing basis	0

Table 31: Results on policy discourses in the Netherlands

Policy discourses include the involvement of several different levels of government and agencies, as set out below:

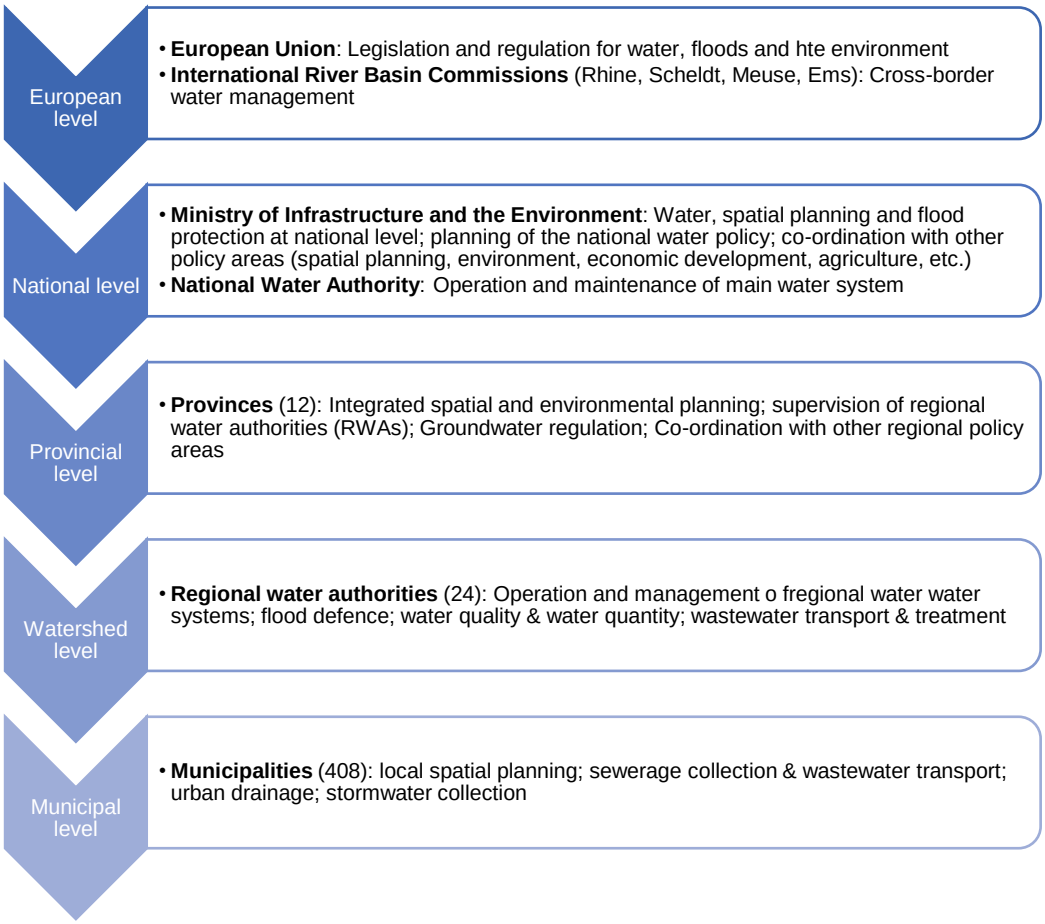

Figure 6: Levels of government and agencies in the Netherlands (OECD, 2014)

Government communications are vast on water-related topics, they address various aspects of water governance, from policies, news, strategies, policies, programmes and administration and quality (Government of the Netherlands, 2016d).

The inclusion of the Dutch population in the questions of water management and water governance seems to be done through the regular general elections, the election process of the water boards, as well as the nationwide campaign of Our Water, an overview of the different aspects of water that the Dutch population may not be aware of yet (Ministry of Infrastructure and Environment, 2016a).
As the internet access among the Dutch is rather high, this programme may reach a significant percentage of the Dutch population. Incorporation of underrepresented voices, such is still to be discovered.

Underlying qualities in the water policies, such as openness, transparency, broad participation, predictability, ethics and integrity are overtly or covertly referred to in the water agencies' manifestos. The practical implementation of these qualities, or their presence in the daily activities of the water governing agencies needs further research.

Stakeholders involvement

Criteria to evaluate stakeholders' involvement	Score for the Netherlands
Most groups of the society are included in the decision making progress.	+
All citizens with voting right are able to have a say, - directly (in a national poll) or	+

- via representatives (via selected foremen).	
There exists an overview of the groups, and a transparent overview of the decision making process, including standpoints in the beginning, result in the end, to double check which groups to what degree can influence the final outcome.	0
Stakeholder involvement can be both command-control or flexible, in relation to water governance issues, there was no clear preference to either, so in an ideal situation, it can be both, as long as the type of involvement and its depth is clear from the beginning.	+
The methods of stakeholder involvement include expert panels, public hearings, written statements and via follow-up from the commission.	0
The Aarhus Convention's aspects, i.e. (1) access to information, (2) participation in decision making and (3) access to justice, Are all available, and more explicitly, access to information is wide, easy and transparent	+
Public is informed over all the relevant projects and can choose to participate in it.	+
The public has the right to recourse procedures.	0
The aim of stakeholder involvement is clearly defined	+
Stakeholder involvement includes, among others, building knowledge, and involvement in water management.	+
The scale and level contests are clear and transparent, and both privilege the environmentally most friendly choice.	0

Table 32: Results on stakeholders' involvement in the Netherlands

Stakeholder involvement in the decision making process is characterized by the regular elections of the water board members. Considering that all inhabitants are allowed to vote on these elections, that are held every four years, a rather significant number of stakeholders can be said to be involved in the decision-making, even though, naturally, it is not a full coverage, as, for example, underage people are excluded from voting (Dutch Water Authorities, 2016).

All citizens with voting rights do have the right to participate in the voting on the local water boards (Dutch Water Authorities, 2016)

Overview of the decision-making process is available on the water boards' website in their annual reports, (Dutch Water Authorities, 2016; Rijkswaterstaat Water, 2015).

Stakeholder involvement is regulated on the waterboard level, with a number of stakeholders cooperating with the waterboards (Rijkswaterstaat Water, 2015). Expert panels, public hearings, written statements and follow-ups from commissions are possible part of the stakeholders involvement, however, they are not specifically mentioned in the waterboards overview of their projects (Dutch Water Authorities, 2016).

The Aarhus convention's aspects are addressed in a way that access to information is provided via the overview website of the waterboards, participation in decision making is primarily via voting for members of the waterboard, however, participating in projects is also possible (Dutch Water Authorities, 2016; van Rijswick & Havekes, 2012). Access to justice is possible, via the formal protection laid down in Article 15 (2) in the Dutch Constitution (Brenninkmeijer, Barkhuysen, & van Emmerik, 1989; Ministry of the Interior and Kingdom Relations, 2008)

Information on water related projects is available on the waterboards overview website, so the public can be informed, however, information on how to participate in it are not clearly presented (Dutch Water Authorities, 2016).

Stakeholder involvement allows for the possibility of building knowledge among stakeholders, and involvement in water management may be possible via contacting the waterboards (Dutch Water Authorities, 2016; van Rijswick & Havekes, 2012). The scale and level contests are not readily available, so it is not possible to declare whether they are clear and transparent, but the environmental aspect of choices seems to be a rather relevant aspect in the Dutch water governance (Dutch Water Authorities, 2016).

4.3 Organization

Trade-offs between social objectives

Criteria to evaluate trade-offs	Score for the Netherlands
The agreed service-level decisions are based on trade-off of costs, benefits and distributional effects of the alternatives.	0
Allocating rights and responsibilities in the case of water governance is a mixture of government and market control, where governmental influence both sets the course and the overall goal, and provide opportunities for the market to act in a way to fulfil those objectives.	+
In a water governance discussion, the social objectives around meeting basic human needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely, are all considered,	+
When focusing on sustainable access to safe drinking water and basic sanitation, these are given more significant weight.	+

Table 33: Results on trade-offs between social objectives in the Netherlands

Trade-offs between social objectives include the view of agreed service-level decisions, which are based on trade-offs of costs, benefits and distributional effects of the different alternatives, in general. In Netherland's case, the right allocation and distributional power is with the water boards, however, the operational details on how the allocation decisions are made would need further research to delve into (Fliwas, 2010; Helpdesk Water, 2016)

Procedures to allocate rights and responsibilities on the water resources are allocated to the different water boards. Details of the allocation procedures seem to be available on a general level (Dutch Water Authorities, 2016; van Rijswick & Havekes, 2012).

Focal points in social objectives include: (i) meeting basic (human) needs; (ii) securing the food supply; (iii) protecting ecosystems; (iv) sharing water resources; (v) managing risks; (vi) valuing water; and (vii) governing water wisely that are part of the UN Water objectives and general water governance guiding principles are included in the Dutch water governance framework (Ministry of the Interior and Kingdom Relations, 2008; United Nations, 2010, 2015a; van Rijswick & Havekes, 2012).

Sustainability is a guiding motive in all water governance related topics, which is stated and practiced at all levels of water governance, from the Constitution to the local water board levels (Dutch Water Authorities, 2016; Ministry of the Interior and Kingdom Relations, 2008; Rijkswaterstaat Water, 2009).

Responsibility, authority, means

Criteria to evaluate	Score for the Netherlands
Property rights in relation to water are defined, most likely as a public good.	+
There is a clear institutional set up for interaction between bodies both horizontally and vertically.	+

The UN declaration on human rights is implemented, and it is stated in policy that access to water is considered a basic human right.	+
Access is provided based on a democratic decision-making process	+
The process is regulated with a wide involvement of stakeholders in a transparent and democratic manner	+
Information gathering, innovation and operational flexibility to respond to opportunities in real time is ideally handled in the local level.	+

Table 34: Results on responsibility, authority and means in the Netherlands

Property rights in relation to water ownership were being developed over a number of centuries, and arrived at their current state at being a public good (Kidd, Feris, Murombo, & Iza, 2015; Kuks, 2002)

Regarding the horizontal, vertical and interactive aspects of the water governance net, the water governing bodies' interactions is covered by both the water authorities and the Water Act, via agencies like the National Water Authority and the Ministry of Infrastructure and the Environment (Dutch Water Authorities, 2016; Kuks, 2002; Ministry of the Interior and Kingdom Relations, 2008)

Dutch Water Authorities is the umbrella term to describe the 22 regional water authorities in the Netherlands, who promotes the water related interests at national and international levels. Regional water authorities are decentralised public authorities, responsible, among other things, for flood protection, water management and treatment of urban wastewater within their regions (Dutch Water Authorities, 2016).

The overview of Dutch water governance is set up as represented below:

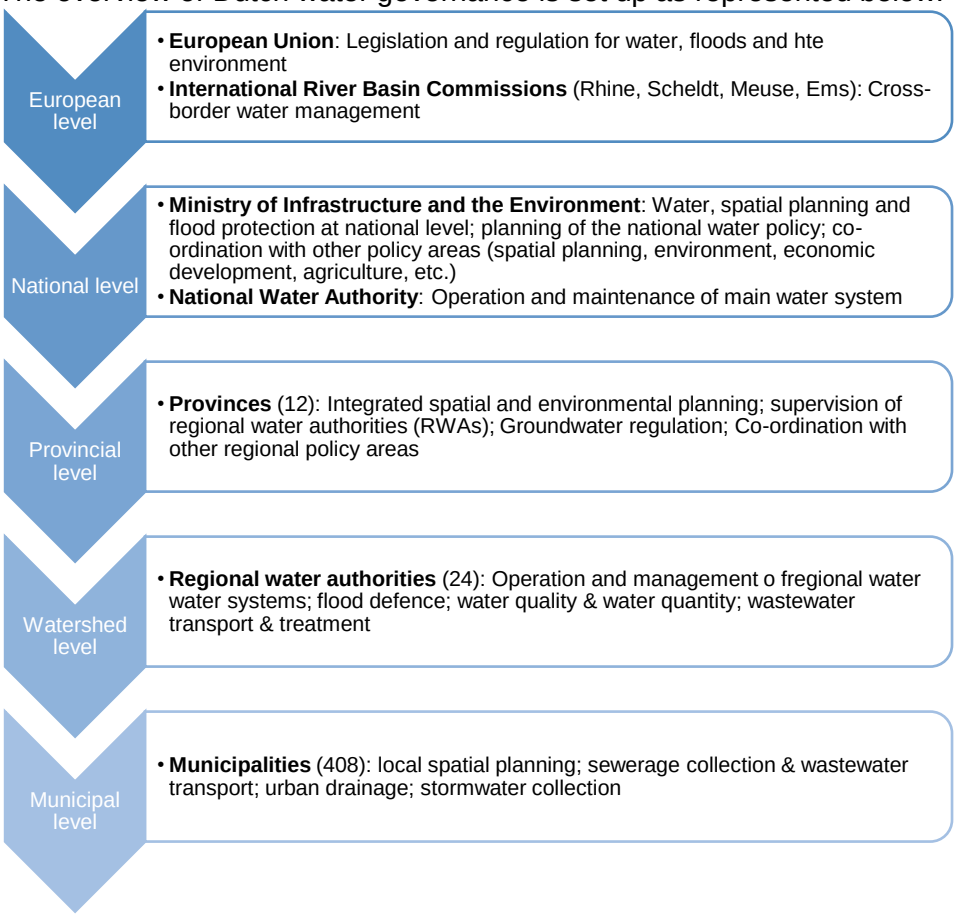

Figure 7: Dutch water governance system (Leterme, 2014)

Water is considered as a universal human right, since the declaration of the UN General Assembly in 2010 (United Nations, 2010), the implementation of which should be reflected on the national legislature in some way. In the Dutch legislation, water is valued as a heritage, a treasure to be protected for future generations (van Rijswick & Havekes, 2012).

Access and allocation to basic resources is governed by the agencies set up, such as the Directorate-General for Spatial Development and Water Affairs (DGRW). The DGRW clusters the policy pursued by the Ministry of Infrastructure and the Environment in the field of the design of the main spatial structure. Together with other agencies, the Directorate-General for Spatial Development and Water Affairs is working on keeping our delta safe, liveable, accessible and competitive, now and in the future. The Directorate-General for Spatial Development and Water Affairs links spatial developments and mobility on the basis of the Infrastructure and Spatial Planning vision. The Directorate-General for Spatial Development and Water Affairs is responsible for the Multi-Year Investment Programme (MIRT), which covers the regional agendas, the co-ordination of administrative consultations and integrated exploratory studies into spatial planning. Thus, the spatial component in the programme is reinforced. In addition, the Directorate-General for Spatial Development and Water Affairs focuses on the simplification of laws governing physical surroundings (Eenvoudig Beter [Simply Better]), the Delta Programme, the water top sector, subsoil policy and GEO information (Ministry of Infrastructure and Environment, 2016b)

Application of the subsidiarity principle is discussed under “Values, Principles and Policy discourses” (Chapter 4.2). The details of the Dutch water authority model are elaborated upon in the “Water Governance the Dutch Water Authority Model” report (Havekes et al., 2015).

Regulations and agreements

Criteria to evaluate	Score for the Netherlands
The rules and agreements are based on shared and agreed values	+
The rules and agreements are in conformity with the law.	+
The rules offer legal certainty regarding rights, responsibilities and accountability.	+
The rules are effective and enforceable.	+
The decision-making power is at the most appropriate level – which is different for each water-related issue, but mostly, each issue is handled at the lowest level of government and escalated appropriately, if needed.	+
The rules are transparent, and they take the distribution effect into account to avoid damage.	+/0
The legal system is clearly based on a legal doctrine.	+
The environmental law is well integrated into the legal system, with a pro-poor lens.	+
Descriptive water objectives are included in the water legislation.	+
Qualitative, or numeric objectives are included in the water legislation.	+
Deliberative processes are planned, on a regular basis.	0

Table 35: Results on regulations and agreements in the Netherlands

The rules and agreements regarding basic sanitation and sustainable access to safe drinking water can be said to be based on shared and agreed values. These rest on the fact that the water boards tasked with establishing the rules and agreements (Dutch Water Authorities, 2016; Ministry of the Interior and Kingdom Relations, 2008) are elected democratically by the eligible voters in each period.

The rules and agreements are governed by the Water Act, and also the Dutch Constitution, and thus, they are in conformity of the law (Ministry of the Interior and Kingdom Relations, 2008; Zeilsta, 2009) They also offer legal certainty regarding rights, responsibilities and

accountability in a way that the Water Act sets out such details (Zeilsta, 2009). The decision making power is at the level of the water boards who have the most relevant local knowledge, and they are free to act within the constraints of the Water Law (Dutch Water Authorities, 2016; Zeilsta, 2009), thus issues are handled at the lowest level of government. Escalation is regulated in a way yet to discovered.

As the rules are published both on the water boards level, as well as the higher levels of the Water Act, etc., they can be said to be transparent (Dutch Water Authorities, 2016; Zeilsta, 2009). Further, the distribution effect should be addressed, but it is not readily understandable from the available information, how it is addressed.

The legal system is a civil law system, that has been developed after the Roman sourced secondary law ceased to apply, and the French rule brought with it the introduction of the Civil Law (Government of the Netherlands, 2016).

The environmental law is part of the legal set up (Government of the Netherlands, 2016a), a pro-poor lens is not easily detectable in it.

Water objectives of different types, qualitative and quantitative are included in the water legislation, as referenced by (Warmer & Dokkum, 2001). Deliberative processes are not clearly included in the set-up of the water boards as far as publicly available information suggests, however, deliberative processes are highly accepted and promoted in the Netherlands in general (Government of the Netherlands, 2016)

Financial arrangements

Criteria to evaluate financial arrangements	Score for the Netherlands
A mixture of solidarity, profit and polluter pays principles plays part in the water governance, with a clear and transparent decision making process leading to the actual mixture that is used in financing for this purposes.	+
Environmental pollution control is in place it is based on the polluter pays principle.	+
Environmental taxes are also in place as a financing method.	+
Crisis financing in relation to water governance is rather hard to grasp in relation to sustainable access to safe drinking water and basic sanitation, however, a crisis financing plan is in place.	0
Project financing is top-down, including the option to drive projects with private financing from bottom-up within the framework.	+

Table 36: Results on financial arrangements in the Netherlands

The financing of the water use is, at least partly, based on user payment, which is elaborated upon in the following. There are various different water taxes: tap water tax; value added tax (VAT); provincial groundwater tax; and tax for installations on public land or water. Businesses and private individuals pay tax on tap water, VAT and tax for installations on public land or water. Provincial groundwater tax is only paid by water companies.
No tax is levied on water used in emergency situations, e.g. water used by fire brigades to put out fires (Government of the Netherlands, 2016e). In more detail, owners of residential or business property must also pay a sewage levy (*rioolheffing*) for their connection to the sewage network. Every year each person is typically taxed for two water taxes (depending on your property). The water board tax (*waterschapsbelasting*) contributes to regional water system management, such as maintenance of dykes and control of water levels. In addition, there is a pollution levy (*verontreinigingsheffing*) for properties not connected to the sewage network, and a water purification levy (*zuiveringsheffing*), contributing to purification

processes used for waste water, for all properties connected to the sewage network. The method of payment varies by municipality. Further, the water taxes do not account for drinking water usage; this is monitored and charged separately by the local water supplier (iAmsterdam, 2015).

Water pricing in the Netherlands, include Dutch provinces charge for groundwater abstractions in order to cover the costs for groundwater management. On a national basis, there is an environmental levy for groundwater abstractions (ClimateChangePost, 2016).

The OECD concludes that current financing arrangements still lead to issues of cost allocation across different categories of stakeholders, both in the present the future. Often, those who create liabilities (e.g. polluting freshwater by non-point sources) do not bear the associated costs (additional costs for treating polluted water for subsequent use). The distribution of the costs and benefits of spatial development also perpetuates the "snowball" effect, driving up the long-term cost of water management. Once spatial development has taken place, path dependency restricts the available risk management options, as alternatives to risk prevention become increasingly less feasible, either economically or politically. In addition, it is not clear how cost recovery mechanisms for water supply, wastewater collection and treatment affect different socio-economic classes and different groups of stakeholders (e.g. large and small families), or encourage efficient water use. In particular, the fact that regional water authorities are functional democracies (democratic representation in governing bodies) with taxation powers and earmarked revenues derives from their initial focus on flood defence; such a governance and financing system is less appropriate for the delivery of wastewater services, for example. This is particularly relevant, since expenditure related to water quality (mainly wastewater treatment) and water system management each account for about 50% of the RWAs budget (Leterme, 2014)

The national government, the provincial authorities, the municipalities, the district water boards and the water companies concluded the Administrative Agreement on Water Affairs (Bestuursakkoord Water) in the spring of 2011. In this document, agreements were set down on the financing of the High Water Protection Programme and structural efficiency gains to the sum of 750 million euros by 2020 for the water system and the water chain. Thus, we will continue to invest in good water management and ensure that the expense for citizens and businesses alike does not increase more than moderately (Government of the Netherlands, 2016).

Water management expenditures across the institutions and functions are as follows (in 2012, EUR millions):

	Water quality	Flood risk management	Water quantity management/ water systems management	Water management-related tasks/ distributed across functions	Not specifically allocated/ for other tasks	Total
Ministry of Infrastructure and the Environment	273	650	50	X	37	1010
Provinces	X	20	64	52	X	136
Regional water authorities	1467	270	992	X	62	2790
Municipalities	1360	X	X	X	X	1360
Drinking water companies	1370	X	X	X	X	1370
Total	**4470**	**940**	**1106**	**52**	**99**	**6670**

Notes: x: not applicable. For the Ministry of Infrastructure and the Environment and the provinces, costs associated with the management of water barriers is categorised here under flood risk management. For the regional water authorities, costs associated with wastewater treatment are included in the category water quality.
Table 37: Distribution of total expenditures for water management across institutions and functions 2012 (EUR millions) in the Netherlands (Leterme, 2014)

Regional water authorities are legally embedded in the overall democratic structure of the Netherlands. They are therefore empowered to collect taxes, which totalled 2.7 billion euros in 2016. This equals 8% of the total tax burden in the Netherlands. An average Dutch family owning a house worth 200.000 euros pays an average of 315 euros per year for regional water management (Dutch Water Authorities, 2016).

Political or financial crisis situations have not been found to be specifically addressed by the legislation. Further research is needed to find out how the different organizations would each address such a crisis, based on their manifestos or rules of operations.

Project financing seems to be top-down in a way that a certain part of GDP is allocated for water and sanitation projects (see above), as well as bottom-up, as the charges for use of water are charged on the final user, or the person or company applying for licences.

4.4 Implementation

Engineering and monitoring

Criteria to evaluate	Score for the Netherlands
The design and implementation of projects is from global design to detailed design.	+
The design and implementation correspond to the agreed SLAs.	+
The water infrastructure meets the demand for water.	+
There is an environmental monitoring system set up to ensure that the monitoring systems provide relevant and reliable data.	0
The infrastructure helps to maintain or enhance the quality of water resources for ecosystems and humans, and it ensures that aquifers are not overtaxed to points of instability.	+
The engineering and monitoring aspect coordinates resource uses and impacts within appropriate physical units.	0
Innovative approaches are considered and integrated into the already existing system.	0
There is a balance, that is accepted by the stakeholders, between enforceable standards and flexibility in local implementation.	+

Table 38: Results on engineering and monitoring in the Netherlands

The Dutch water infrastructure seems to be built up from the global design, stemming from the obligation included in the Constitution for the authorities to maintain the country in a habitable state and protect and improve the environment. The Water Act is stemming from this obligation, and the details are developed from this overall goal (van Rijswick & Havekes, 2012).

The design and implementation would correspond to the agreed SLAs in a way that they are governed by both the Water Act and the Environmental Management Act, that are all under the jurisdiction of the Dutch Constitution (Government of the Netherlands, 2016a; Ministry of the Interior and Kingdom Relations, 2008; Zeilsta, 2009).

It is safe to say that the current water infrastructure meets the demand for water, both in terms of available safe, sustainable sourced drinking water as well as that of basic sanitation, considering that the country's current coverage of the country (Tobergte & Curtis, 2013a)

The current monitoring system for environmental purposes is set up in a way to ensure that the monitoring systems provide relevant and reliable data, including a number of organizations (governmental and non-governmental) who monitor activities for environmental purposes (Central Bureau voor de Statistiek, 2016; PBL Netherlands Environmental Assessment Agency, 2016).

The infrastructure helps to maintain the quality of water resources for ecosystems and humans, and it ensures that aquifers are not overtaxed to the point of instability through the introduction and applicability of the Environmental Management Act (Government of the Netherlands, 2016a).

The engineering and monitoring aspect coordinates resource uses and impacts within appropriate physical units via the organization of the waterboards (Dutch Water Authorities, 2016).

Innovative approaches are considered by the waterboards and the water companies, who have their own R&D departments (Dutch Water Authorities, 2016), outside projects are probably more welcome in a way that they are submitted to these departments, and are worked on in a cooperation, as opposed to individual projects outside the legislative framework.

For certain projects, stakeholders would wish to have more flexibility in local implementation, especially with regard to more sustainable solutions in basic sanitation, e.g. sustainable toilets in newly built neighbourhoods (Waternet, 2015), however, as to the overall scale of such sentiments among stakeholders, there is no representative poll readily available, so no conclusion on this aspect can be drawn.

In conclusion, most of the engineering and monitoring criteria set out earlier, are met in the case of the Netherlands.

Enforcement

Criteria to evaluate enforcement	Score for the Netherlands
There is a clear process of enforcement	+
The available enforcement is available to everybody, and it can be both public or private, depending on the country's underlying cultural values.	+
There are appropriate remedies available, where appropriate is defined by what the stakeholders deem as appropriate based on the underlying common values.	+
Enforcement is available via both administrative, judicial and private channels.	+
Feedback and monitoring are available together with the results for enforcement.	+
Enforcement across the country are mainly standardized with certain flexibility to consider local features – in a way that most stakeholders would agree, based on common values.	+
There are formal and informal feedback responses to policy changes that the current system would need to take into consideration as a feedback for improving the system.	+

Table 39: Results on enforcement in the Netherlands

Regarding the theories of enforcement, the first aspect is whether there is a clear process of enforcement and whether the available enforcement is public or private. The process of enforcement is set down as filing papers (10 days), trial and judgement (422 days) and enforcement of judgement (62 days), as the public enforcement process, which takes approximately 514 days (World Bank, 2016b). The available private enforcement options and alternative dispute resolution options include the following set-up:

Alternative dispute resolution	
1. Arbitration	
1.a is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing substantially all its aspects?	Yes
1.b Are there any commercial disputes – aside from those that deal with public order or public policy – that cannot be submitted to arbitration?	Yes
1.c Are valid arbitration clauses or agreements usually enforced by the courts?	Yes
2. Mediation / Conciliation	
2.a Is voluntary mediation or conciliation available?	Yes
2.b Are mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing substantially all their aspects?	No
2.c Are there financial incentives for parties to attempt mediation or conciliation (i.e. if mediation or conciliation is successful, a refund of court filing fees, income tax credits or the like)?	No

Table 40: Alternative Dispute Resolution options in the Netherlands (World Bank, 2016b)

The minister of security and justice manage law enforcement services in the Netherlands. The police force is made up of 10 regional units, a Central Unit for specialist activities and a separate centre for all business operations. The new structure aims to help cooperation within the organization between the three policing levels: local, regional and national (Interpol, 2016).

Feedback and monitoring in relation to enforcement are discussed under “Engineering and monitoring” earlier. Diversity of enforcement is standardized officially; local features do not seem to be present in it.

Conflict prevention and resolution

Criteria to evaluate conflict prevention and resolution	Score for the Netherlands
All the following methods are accepted for conflict prevention and resolution: - mediation, - arbitration or - court proceedings, or - previously formulated mutually agreed conflict resolution processes.	+
Conflicts are primarily treated at the source, with a clear process on when and how to escalate them if needed.	+
There is a stable and reliable justice system to handle conflicts.	+
Interdisciplinary solutions are used in the case of water conflicts, where applicable.	+

Table 41: Results on conflict prevention and resolution in the Netherlands

Methods of conflict prevention and resolution generally would include mediation, arbitration or court proceedings in addition to previously formulated mutually agreed conflict resolution processes. A Dutch Arbitration Institute (NAI) has been established since 1949; it focuses on arbitration, binding advice and mediation, in particular by providing trade and industry with soundly regulated arbitral, binding advice and mediation procedures (Netherlands Arbitration Institute, 2016). However, no evidence has been found that this advice is also practiced in relation to environmental issues on large, or issues regarding drinking water and basic sanitation in particular.

Practical methods of conflict prevention and resolution include naturally laws, regulations, however, the alternative dispute resolution procedures are rather widely accepted, as higher education certificates in conflict resolution are also available from well-established universities, (Universiteit Utrecht, 2016; Universiteit van Amsterdam, 2016).

The Dutch justice system focuses on three areas of law: civil law, administrative law and criminal law. The Netherlands is divided into 11 district courts, 4 courts of appeal and 1

Supreme Court. To safeguard the quality of the justice system and to make the courts accessible to everyone, the Netherlands is divided into jurisdictions. If one of the parties disagrees with the court's ruling, the case may be referred to a court of appeal and subsequently, through an appeal in cassation, to the Supreme Court (De Rechtspraak, 2016)

The justice system seems capable and prepared to handle the arising conflicts. For international water conflict resolutions the Dutch set up a consortium, the Water Diplomacy Consortium, to handle such conflicts (Government of the Netherlands, 2012).

Interdisciplinary solutions for the prevention and solution of water conflicts need to be examined considering the types of arising interdisciplinary water conflicts that may come up, and the current legislation and practice.

4.5 Conclusion

In conclusion, this chapter described each building block in the van Rijswick water governance framework (2014), based on the detailed concepts developed in Chapter 2, and the operationalization developed in Chapter 3, in order to provide a reference point, or benchmark, against which it Ghana, the focus country will be measured in the following chapter.

On most of the criteria the Netherlands score positive, with data being available and up to date and useful. In a number of cases, there is a zero score, meaning either not available information, or exists, but not up-to-date; exists, but not well developed; or the result is neutral. No negative scores were given to any aspects of the Dutch water governance, which leads to a rather positive view on the overall assessment of it.

5 Results from research in Ghana

5.1 Introduction

In the earlier chapters, the water governance framework of van Rijswick et al (2014) was discussed, conceptualized, operationalized and then a reference country, the Netherlands was analysed in order to provide a benchmark against which, the focus country, Ghana, can be measured. In the following chapter, the different aspects of water governance of Ghana will be discussed based on the developed criteria.

5.2 Content

Water system knowledge

Criteria to evaluate	Score for Ghana
Water systems knowledge includes per area of the lowest level of government involved (municipality) the focus area of the water system per societal function. I.e. industrial, agricultural or private use.	-
An overview of the changes in recent decades per five-year periods to - the natural system – possible new or disappearing rivers or lakes; - the man-made infrastructure, - the changes that involve using the same infrastructure to other functions	-
The actual amount or availability of - blue water and - green water	+
Demographical information and changes are known.	+
A classification system is present that provides an overview of the quality of the available fresh water.	-
Classification overview is updated regularly	-

Resource units of water governance are known and communicated	+
The same unit system is used across the country	+
Quantitative knowledge of the water system includes - the number of rivers – with their water content, - the area of river basins, in standardized, comparable measure units, - volume of water resources, per both river basins, as well as per area of government	+
Considering that the river basins and the governmental units may not overlap, an overview chart of these exists.	-
A measure of sustainability is included in the system and is tracked throughout time	0

Table 42: Results on water system knowledge in Ghana

The societal function of the water system can be divided between industrial, agricultural and private use. In the case of Ghana, all three are covered, by different agencies, e.g. Community Water and Sanitation Agency (CWSA) (Government of Ghana, 1998), the Water Resources Commission (WRC) (WRC, 2016), or the Ghana Water Company Limited (GWCL) (Government of Ghana, 2015a) , and they mention that for the different uses of water, a licence needs to be taken out, and the list of licenced activities include: domestic, Commercial, Industrial, Agricultural, Power generation, Fisheries (aquaculture), Recreational, and Under water (wood) harvesting. The licenced water users include:

Water users	**2009**	**2010**
Power Generation	2	2
Recreation/ Navigation	1	1
Domestic	103	107
Mining	24	31
Industrial	10	11
Irrigation	9	10
Aquaculture	5	9
Total	**154**	**171**

Table 43: Water users by type in Ghana (WRC, 2016)

Changes in the function of the land should consider the fact that in Ghana the coastal area covers approximately 7% of the total land area, but is home to about 25% of the population (Yanda & Mubaya, 2011).

Changes in the natural water system are mostly due to both human induced changes that led to climate change, as well as the infrastructural changes which aim to be improved for the general population's betterment. However, in Ghana, 38% of households were reported to be getting and using water from unsafe sources (e.g. springs, river, open wells) for drinking and/or cooking (Whittington et al., 2009).

The supply of fresh water can be divided into two areas, namely: surface and groundwater. The surface water resources are mainly from three river systems draining the country – the Volta, South Western and Coastal river systems – constituting 70%, 22% and 8% respectively of the total land area of about 240,000 square kilometres of Ghana. Apart from this the only important freshwater source is the Lake Bosomtwi, which is a meteoritic crater located in the forest zone, with a surface area of 50 square kilometres and a maximum of 78 metres depth (Entsua-Mensah, Essegbey, Frempong, & Engmann, 2007; Government of Ghana, 2015b). The ultimate source for surface and groundwater is rainwater. Though it is not much exploited directly, rainwater harvesting has a great potential to increase water availability. The total annual runoff is 56.4 billion m^3 with River Volta accounting for 41.6 billion m^3. The mean annual runoff from Ghana alone is about 40 billion m^3. Wide disparities between the wet season and dry season flows characterize the runoffs. The total water resources available from surface water sources are 39.4 billion m^3 per annum (Entsua-Mensah et al., 2007; Government of Ghana, 2015b).

The water supply is mapped out based on the basin system, covering the Densu, Ankobra, Pra, White Volta and Tano basins (“Basins » Water Resources Commission Of Ghana,” n.d.) The water supply is further categorized into river systems, namely The major sub-basins of the Volta include the Black and White Volta Rivers, the Oti River and the Lower Volta, including Lake Volta. The South-Western Rivers System comprises the Bia, Tano, Ankobra and Pra Rivers, while the Coastal Rivers System is made up of Ochi-Amissah, Ochi-Nakwa, Ayensu, Densu and Tordzie/Aka Rivers. The Volta River basin is shared with Cote d'Ivoire, Burkina Faso, Togo, Benin and Mali. The Bia is shared with Cote d'Ivoire, while the lower reaches of the Tano River also form part of the boundary with Cote d'Ivoire. (WRC, 2016)

The area of these basins are as follows:

River basin	Drainage area (in km^2)
Bia	6,965
Tano	16,060
Ankobra	8,366
Pra	23,188
Densu	2,564
Ayensu	1,709
Ochi-Nakwa	1,409
Ochi – Amisa	15,576
Kakum	867

Table 43a : Area of river basins in Ghana (Darko, Ansa-Asare, & Paintsil, 2013)

The demand for water changes according to the population size, which has an estimated growth of 2.7 percent annually, and standing at 25 million people in 2014 (Vidal, 2011). To grasp it in another way, on the basis of surface water resources alone, the consumptive water demand for 2020 is expected to be 5.13 billion m^3, which is 13 percent of the surface water resources. Likewise, the non-consumptive demand can also be met from the surface water available. Rainwater harvesting has also become common and has a great potential to increase water availability in certain localised areas. It can be concluded, that if properly conserved and distributed, the surface water resources of the country should be adequate to meet future demands (WRC, 2016).

The quality of fresh water is categorized into four categories, based on the works of WRC and (Darko et al., 2013), which is based on the Solvay Water Quality Index, especially tailored for Ghana.

WQI Range	Class	Description
> 80	I	Good—Unpolluted and/or recovering from pollution
50-80	II	Fairly good
25-50	III	Poor quality
< 25	IV	Grossly polluted

Table 43b: Quality of water in Ghana (Darko et al., 2013)

The resource units used in water governance and exploratory field searches are measured in m^3.

The quantitative water system knowledge, covering the number of rivers, area of river basins, have been mentioned earlier, together with the volume of water resources. As for the geographical distribution of water resources, it can be deduced from the above. Water quality per area is and availability are covered in by the WRC, together with the possible scarcity issues.

Ecological aspects, such as indicators of sustainability are included in such way that the legal background agency is set up - Environmental Protection Agency (EPA) was established in 1994 to ensure that water operations would not cause any harm to the environment (Government of Ghana, 2015a).

As for the criteria defined above, in Ghana, the readily available water systems knowledge does not include the lowest level of government involved, it rather focuses on the top: ministry and directorates, which begs the question whether it means that there are no lower level governing bodies, or if there is no transparent available knowledge about them. The focus area of the water system per societal function is available, focused on the country as a whole, instead of by municipality, so more geographically detailed information would be useful. Some information is available on the changes in recent times, but not in an organized, methodical way. Information about the availability of blue water, green water and virtual water flux would be needed. As for the demographical changes, as population change is considered a significant influence on the pressure on the water system, there is data available on population change over the years. A classification system is present, with a 4-measure scale. Whether the water in the different water basins, or smaller geographical unit is classified based on this classification system is yet to be seen. I have not found an earlier report on the water quality in the country. Water is measured in m^3. Quantitative knowledge of the water system does include the number of rivers – with their water content, the area of river basins, in standardized, comparable measure units, volume of water resources, per river basins, but not per area of government. Considering that the river basins and the governmental units may not overlap, an overview chart of these would also be helpful, but it is missing. Also, considering the sustainability of the system, ideally there would be included a measure of sustainability – and tracked throughout time, in reality there is the EPA set up, but have not found a historical overview of the water-related environmental issues.

Values, principles, policy discourses

Values

Criteria to evaluate values	Score for Ghana
There is a list of stakeholders available who are involved.	0
A list of common interests is available that the stakeholders agree on.	+
The goal to have sufficient and clean drinking water and basic sanitation to all is included in the water policy.	0
Water policy includes measures, deadlines and other aspects of accountability.	0
Sustainable and fair use is defined in the policy documents and included as a goal.	+
The no harm principle is either explicitly or implicitly included in the water policy document(s), with an actionable plan on how to implement it.	0
The available techno-scientific knowledge, as defined earlier, is be referred to when setting up water policy documents, together with the historical, cultural and socio-political aspects of water usage.	0
Access to drinking water and basic sanitation is considered as a universal human right, and is treated as such in the policy documents.	0
The public view on the topic is clear and articulated via either a national poll, or other representative work.	0
The country's ideology or religion is known, and has a clear attitude towards water as universal human right.	+
Participation of stakeholders ensure that their input would reveal the underlying framings and values regarding water.	0
Protection of human health and the environment is a priority, included in the constitution or other underlying basic legislation.	+
The way water resources are allocated among societal functions clearly reflects the	+

underlying value system.	
Water resources are explicitly protected.	0

Table 44: Results on values in Ghana

Common interests in relation to water policy can be deducted from the 1959 agreement between the Government of Ghana and the World Health Organisation for a study to be conducted into water sector development of the country. It focused on technical engineering, establishment of a national water and sewerage authority and financing methods. Furthermore, the study recommended the preparation of a Master Plan for water supply and sewerage services in Accra-Tema covering the twenty-year period 1960 to 1980.

In line with the recommendations of the WHO, the Ghana Water and Sewerage Corporation (GWSC), was established in 1965 under an Act of Parliament (Act 310) as a legal public utility entity. GWSC was to be responsible for: (i) Water supply and sanitation in rural as well as urban areas; (ii) the conduct of research on water and sewerage as well as the making of engineering surveys and plans; (iii) the construction and operation of water and sewerage works, and (iv) the setting of standards and prices and collection of revenues. (Government of Ghana, 2015a).

From this, we can deduce that the availability of sufficient and clean drinking water and basic sanitation to all is one of the underlying values. Further, since 1994, the establishment of the EPA, and the underlying argument that one of its goals is to ensure that water operations would not cause harm for the environment, the sustainable and fair use of resources can be said to be one of the goals, together with the no harm principle.

Considering the universal approach, water policy seems to focus on both the techno-scientific background, considering the natural water systems as well as the socio-political aspects of health, safety and general human well-being considered for water policy, thus the universal approach can be detected.

Regarding water as universal human right, as Ghana was a member of the UN at the time its general assembly declared access to water and basis sanitation a human right, it is safe to say that this is also true for Ghana (United Nations, 2010).

Regarding public view on water, other than the fact that they are unsatisfied with the lack of political support for environmental issues, there does not seem to be a national poll on the view on water related values or principles (Mantey, 2012).

The country's underlying ideology since its Independence in 1957 has been tending towards a democracy (Government of Ghana, 2016b).

As for the criteria defined above, there does not seem to be a readily available overview of the involved stakeholders. Common interests cannot be deduced from the available sources. The goal to have sufficient and clean drinking water and basic sanitation to all is part of the local legislation, but it is not readily available to understand what measures, deadlines and other aspects of accountability are included as well. Sustainable and fair use is hinted by the fact that the country established EPA, and Ghana was a UN member when the declaration regarding access to water and basic sanitation was declared a human right. The no harm principle is implied on by the fact that EPA was established, however, its more explicit mention is missing, together with the actionable plan and the implementation plan. References to the available techno-scientific knowledge, as defined earlier, did not seem to be referred to, neither the historical, cultural and socio-political aspects of water usage. Access to drinking water and basic sanitation is considered a human right, but the local implementation into policy documents is not completely clear. The public view can be spotted

as far as their discontent with support for environmental issues, however, a national poll or other relevant overview on the view of the general public is missing. The country does not have a strong, individual ideology, it is a democracy with a strong military presence. Participation of stakeholders seems to be limited mostly to voting. The availability of the relevant infrastructure would suggest that protection of human health and the environment is a priority, however, inclusion in the constitution would need to be further checked. The way water resources are allocated among societal functions should clearly reflect the underlying value system, however, in this case, it is not the case. Explicit protection of water resources is not supported by data found.

Principles

Criteria to evaluate principles	Score for Ghana
There is sufficient decentralization to be able to address water issues at the lowest possible level of government	0
The system is integrated, proportionality is considered.	0
Public participation is included in the policy process, together with environmental principles, such as prevention and polluter pays.	0
Water governance is globally designed and from a big picture goal it would be further developed in detail	+
Both actual and virtual water flows are considered when discussing the whole of water governance	+
The value of water is considered as a public good	+
Boundaries to benefits and costs are defined.	0
There is a proportional equivalence between costs and benefits.	0
Outcomes should be emphasised in water policies, i.e. the goal to provide sustainable access to safe drinking water and basic sanitation.	+
The governance structure is set up in a way that arising issues can be tackled at the source.	0
There is a clear system of how issues are escalated, if need be.	+

Table 45: Results on principles in Ghana

Water governance system is set up with the different agencies in place, namely, the Water Resources Commission (WRC) was founded in 1996 to be in charge of overall regulation and management of water resources utilization. In 1997, the Public Utilities Regulatory Commission (PURC) came into being with the purpose of setting tariffs and quality standards for the operation of public utilities. Community Water and Sanitation Agency (CWSA) was established in 1998 to be responsible for management of rural water supply systems, hygiene education and provision of sanitary facilities. After the establishment of CWSA, 120 water supply systems serving small towns and rural communities were transferred to the District Assemblies and Communities to manage under the community-ownership and management scheme. Finally, pursuant to the Statutory Corporations (Conversion to Companies) Act 461 of 1993 as amended by LI 1648, on 1st July 1999, GWSC was converted into a 100% state owned limited liability, Ghana Water Company Limited, with the responsibility for urban water supply only. (Government of Ghana, 2015a).

Their cooperation is voluntary, and manifold, with a clear distinction between roles, such as, WRC is a regulator managing and regulating the use of freshwater while GWCL is a service provider that distributes treated freshwater to urban areas in Ghana. Co-operations exist around water resources data collection and processing; use and development of water resources; water related regulatory activities; and civil societies and NGOs.

Regarding the polluter pays principle, the EPA has a guideline on aqua culture, and also fees and charges on “Mast Installation and Aqua Culture”, demonstrating something similar to this principle (Tobergte & Curtis, 2013b).

The water system design is global designed focused, with the main regulatory bodies established via an act of Parliament, and given a main focus area to concentrate on (Foster & Pushak, 2011; Government of Ghana, 2015b, 2016b; World Bank, 2016d).

According to a World Bank report, Ghana exports virtual water in the amount of 18 Gm^3/year. (Mekonnen & Hoekstra, 2011). How this is considered in the national legislation, is as a good that the given agency or authority is empowered to grant rights to, thus, as a private good.

Outcomes of access are considered in the way that it is part of the mission statement of the water agencies (GWCL, WRC) to regulate and manage sustainable utilization of water resources in Ghana, and broadly, to promote equitable access rights and benefits for all segments of society (Government of Ghana, 2015b).

Regarding the question of tackling issues at the source, or escalation thereof, the main institutional set-up seems to be top-down based on the currently available information (Adjei & Dijk, 2012; Government of Ghana, 2015a; WRC, 2016).

Environmental protection is considered in a way that the legal background agency is set up - Environmental Protection Agency (EPA) was established in 1994 to ensure that water operations would not cause any harm to the environment (Government of Ghana, 2015a).

As criteria to assess this aspect of water governance, I was unable to find sufficient decentralization in the system, with a strong central governing role of the relevant ministry's directorates. The directorates serving for different water governance purposes do not seem to be integrated, other than belonging under the same ministry. Proportionality does not seem to be address. Public participation seems to be limited to voting in the general election, and possibly including comments in the newspapers, ex post facto. Environmental principles, such as prevention and polluter pays seem to be addressed via setting up the EPA, however, its practical impact is not readily visible. Water governance is globally designed, as defined earlier, but without visibility of the development of the details. Discussion of actual and virtual water flows seems to be missing when discussing the whole of water governance. It is not readily visible whether water is considered a public good, but in absence of information leading elsewhere, we may assume that it is. Boundaries to benefits and costs may be defined, but not readily available to the public, thus it is also difficult to comment whether there is a proportional equivalence between costs and benefits. Outcomes are emphasised in water policies, in their mission statements. Regarding tackling issues at the source, the system seems to be an exact opposite: a top-down system.

Policy discourses

Criteria to evaluate policy discourses on	Score for Ghana
All viable courses of action, viewpoints and contents are considered in a policy discourse	0
Frame and perception are analysed in relation to what government communications reveal about policy discourses.	0
Voices of women and the poor, and any other marginalized groups are included in the water policy discourse, via formal or informal methods.	0
Underlying qualities of openness, transparency, broad participation, predictability, ethics and integrity are included in water policies	+
There are regular studies to check that these voices are included on an ongoing basis	-

Table 46: Results on policy discourses in Ghana

Policy discourses include the involvement of local agencies, NGOs, international organizations, and projects to improve access to drinking water and public sanitation (Foster & Pushak, 2011; Government of Ghana, 2016b, 2016c; Ofosu, 2012; World Bank, 2016d; WRC, 2016).

Government communications are very limited on water-related topic. The communications , address impending floods, (Ministry of Communication, 2015), and the introduction of pre-paid meters for industrial and commercial users of water (Ministry of Information & Media Relations, 2014). These seem to cover large stakeholders, and minimizing harm to the country, in terms of avoiding flood damage on one hand and avoiding loss of state income from the non-payment by the largest water users on the other hand.

Incorporation of the underrepresented voices does not seem to be very well pursued. One example of such attempt is that one of the 15 members of the regulatory board of WRC, needs to be a woman (WRC, 2016).

Underlying qualities in the water policies, such as openness, transparency, broad participation, predictability, ethics and integrity are overtly or covertly referred to in the water agencies' manifestos. The practical implementation of these qualities, or their presence in the daily activities of the water governing agencies needs further research.

The state power's interest in nature can be found to be of a protective one, with regard to the mission statements of the Ministry (Government of Ghana, 2015b), which includes that "securing the natural ecosystem and resource development for the benefit of all segments of society", as well as the different agencies' separate mission statements, however, covertly.

As for the criteria defined above, several stakeholders are involved in the policy making process, however, it is not clearly stated, nor readily visible that all viable courses of action, viewpoints and contents were considered in a given policy discourse. Government communications reveal prevention of harm and focus on large stakeholders as the two main themes in policy discourses on water governance. Underrepresented voices seem to be underrepresented, with efforts made to include women. Underlying qualities of openness, transparency, broad participation, predictability, ethics and integrity are covertly or overtly referred to, however, the level of practical implementation needs still to be determined.

Stakeholders involvement

Criteria to evaluate stakeholders' involvement	Score for Ghana
Most groups of the society are included in the decision making progress.	+
All citizens with voting right are able to have a say, - directly (in a national poll) or - via representatives (via selected foremen).	+
There exists an overview of the groups, and a transparent overview of the decision making process, including standpoints in the beginning, result in the end, to double check which groups to what degree can influence the final outcome.	-
Stakeholder involvement can be both command-control or flexible, in relation to water governance issues, there was no clear preference to either, so in an ideal situation, it can be both, as long as the type of involvement and its depth is clear from the beginning.	0
The methods of stakeholder involvement include expert panels, public hearings, written statements and via follow-up from the commission.	0
The Aarhus Convention's aspects, i.e. (1) access to information, (2) participation in decision making and (3) access to justice, Are all available, and more explicitly, access to information is wide, easy and transparent,	0
Public is informed over all the relevant projects and can choose to participate in it.	-
The public has the right to recourse procedures.	+
The aim of stakeholder involvement is clearly defined	-

Stakeholder involvement includes, among others, building knowledge, and involvement in water management.	+
The scale and level contests are clear and transparent, and both privilege the environmentally most friendly choice.	-

Table 47: Results on stakeholders' involvement in Ghana

The water sector strategy plan has been prepared through a consultative and participatory process involving key sector stakeholders at the national, regional and district levels, according to the Government of Ghana. The plan builds extensively on existing documents developed across the three main sub-sectors – notably the Community Water and Sanitation Agency Strategic Investment Plan (2008-2013, 2015), Ghana Water Company Limited Strategic Investment Plan (2007-2015, 2025), and the Draft Integrated Water Resource Management Plan (2011-2015) developed by the Water Resources Commission. The plan also builds on the National Environmental Sanitation Strategy and Action Plan (2011-2015). (Ministry of Water Resources Works and Housing; & Government of Ghana, 2014). This does not cover whether a relevant percentage of the population is covered by this cooperation. However, considering that Ghana is a democracy, where national elections take place regularly, it is safe to say that if the Ghanaian democratic institutions work in a democratic set-up, the width of stakeholder involvement is according to democratic principles. With regard to NGOs, the official water agencies do cooperate with the umbrella organization of CONIWAS (Coalition of NGOs in Water and Sanitation); as well as internationally with the EU, UN, Global Water Partnership and other national or continental water organizations (WRC, 2016).

Depth of stakeholder involvement is different from group to group, depending on the project in question, and the financing structure of the project as well. A group by group break-down on project by project base is to follow on the depth of stakeholder involvement (Nexus Strategic Partnerships Limited, 2015; SafeWaterNetwork, 2015; WRC, 2016).

Regarding the flexibility versus rigidity of the stakeholder involvement, a further scale would need to be developed, as for the stakeholder involvement on the personal level, i.e. voting, it is a rigid procedure, as set in the Constitution. However, stakeholder involvement relating to the NGOs, or the international organizations may be a whole different structure, and timing. A list of stakeholders together with the types of involvement needs to be developed to show an overview of this aspect of water governance.

As for the methods of stakeholder involvement, expert panels, public hearings, written statements or follow-up, the Ghanaian methods of involvement include e.g. shared projects, such as the *Hydrogeological Assessment of the Northern Region of Ghana Project* (HAP), which was carried out in the Northern, Upper East and Upper West Regions, with a funding from Canadian International Development Agency (CIDA) between Oct. 2005 – Dec. 2011, where the project funding was via CIDA and the implementation was carried out by Water Resources Commission (Ghana) and SNC-Lavalin/INRS (Canada) (WRC, 2016).

Regarding the Aarhus Convention's aspects of (1) access to information; (2) participation in decision making and (3) access to justice; Ghana's case shows that the overall access to information is very much scaled. National legislation is readily available online (Government of Ghana, 2016a), certain information on the topic of water governance is available on the websites of the water agencies (Adjei & Dijk, 2012; Government of Ghana, 2015a; WRC, 2016) and participation in decision making is as discussed above. Access to justice, which is understood as "the right to review procedures to challenge public decisions that have been made without respecting the two aforementioned rights or environmental law in general" is an aspect of the Aarhus Convention that needs further research, and may be discussed in the

Environmental Protection Act, and the Constitution (Bennion, 1962; Environmental Protection Council, 1988).

Aim of stakeholder involvement in the process is mainly to be involved in water management and sharing knowledge, in relation to the involvement of international organizations, looking at the projects they are involved with, such as the project between CIDA – WRC shared project. (WRC, 2016) Scale and level contests, such as the preference and privilege given to the administrative, hydrological, ecosystem or economic boundaries; versus the level contest on the geographical scale of the privileged activities would be covered by information several sources (Government of Ghana, 2015b; Water and Sanitation Programme & UNICEF, 2015; WHO-Unicef Joint Monitoring Programme, 2014).

As for the criteria defined above, most groups of the society should be included in the decision making process and quite a lot are, on various levels. Average citizen-involvement seems to have included direct involvement, in addition to the democratic elections and the indirect involvement that draws with it. There does not seem to be a clear overview of the groups, and a transparent overview of the decision making process, including standpoints in the beginning, result in the end, to double check which groups to what degree can influence the final outcome. Stakeholder involvement may be clear for the participants, but the rules are not readily available for the public. Involvement used does include expert panels, public hearings, written statements and via follow-up from the commission. The Aarhus Convention's aspects are mostly available, with some more information need on the availability of justice. The aim of stakeholder involvement needs to be more clearly defined and it should include, among others, building knowledge, and involvement in water management. Ideally the scale and level contests should be clear and transparent, and both should privilege the environmentally friendliest choice.

5.3 Organization

Trade-offs between social objectives

Criteria to evaluate trade-offs	Score for Ghana
The agreed service-level decisions are based on trade-off of costs, benefits and distributional effects of the alternatives.	-
Allocating rights and responsibilities in the case of water governance is a mixture of government and market control, where governmental influence both sets the course and the overall goal, and provide opportunities for the market to act in a way to fulfil those objectives.	+
In a water governance discussion, the social objectives around meeting basic human needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely, are all considered,	0
When focusing on sustainable access to safe drinking water and basic sanitation, these are given more significant weight.	0

Table 48: Results on trade-offs between social objectives in Ghana

Trade-offs between social objectives include the view of agreed service-level decisions, which are based on trade-offs of costs, benefits and distributional effects of the different alternatives, in general. In Ghana's case, the right allocation and distributional power is with the WRC (WRC, 2016), however, the operational details on how the allocation decisions are made would need further research to delve into, as they are not readily available for the public.

Procedures to allocate rights and responsibilities on the water resources are allocated to the different water agencies, GWCL, WRC, and CWSA. Details of the allocation procedures is to follow(Adjei & Dijk, 2012; Government of Ghana, 2015a; WRC, 2016).

Focal points in social objectives include: (i) meeting basic (human) needs; (ii) securing the food supply; (iii) protecting ecosystems; (iv) sharing water resources; (v) managing risks; (vi) valuing water; and (vii) governing water wisely that are part of the UN Water objectives and general water governance guiding principles are covertly included in the Ghanaian water governance framework (Akuoko-Asibey, 1996; Mahama et al., 2014; Whittington et al., 2009).

As for the criteria defined above, the agreed service-level decisions should be based on trade-off of costs, benefits and distributional effects of the alternatives, however, this information is not readily available. Allocating rights and responsibilities in the case of water governance, would ideally be a mixture of government and market control, where governmental influence would both set the course and the overall goal, and provide opportunities for the market to act in a way to fulfil those objectives, however, how it works in Ghana is not readily understandable. The social objectives around meeting basic human needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely, seem to be considered covertly in the water governance framework.

Responsibility, authority, means

Criteria to evaluate	Score for Ghana
Property rights in relation to water are defined, most likely as a public good.	+
There is a clear institutional set up for interaction between bodies both horizontally and vertically.	0
The UN declaration on human rights is implemented, and it is stated in policy that access to water is considered a basic human right.	-
Access is provided based on a democratic decision-making process	+
The process is regulated with a wide involvement of stakeholders in a transparent and democratic manner	0
Information gathering, innovation and operational flexibility to respond to opportunities in real time is ideally handled in the local level.	0

Table 49: Results on responsibility, authority and means in Ghana

Property rights in relation to water ownership are defined by the water agencies, as they have the right to allocate rights to water. Thus, they act as guardians of a state (public) property, where the owner is the state, the administrate are state agencies, and everyone else can use the water according to the rules set by the agencies. (Adubofour et al., 2012; Kremer, Leino, Miguel, & Zwane, 2009; Mensah & FitzGibbon, 2012; Peloso & Morinville, 2014; Williams, Gyampoh, Kizito, & Namara, 2012; *World Development Report*, 2012).

Regarding the horizontal, vertical and interactive aspects of the water governance net, the water governing bodies' interaction does not seem to be officially organized. The institutional set up of the GWCL, WCR and CWLA seems to be horizontal, as they all report to the Ministry of Water Resources, Works and Housing, whereas the directorates specializing in different areas of the water governance, interact with each other horizontally. (Bakker, 2010; Government of Ghana, 2015b; SafeWaterNetwork, 2015; WRC, 2016).

Water is considered as a universal human right, since the declaration of the UN General Assembly in 2010 (United Nations, 2010), the implementation of which should be reflected on the national legislature in some way, or communicated its existence, however, so far, this does not seem to be the case. On the other hand, the fact that the water administering agencies, GWCL, WCR and CWLA, cooperate with international organizations such as the WHO and the UN would point to the fact that this UN declaration on water as universal human right, together with the Water Sector Strategic Development Plan (Ministry of Water

Resources Works and Housing; & Government of Ghana, 2014), would point in this direction. (Hanjra et al., 2012; Opare, 2012; Peloso & Morinville, 2014; World Health Organization, 2014).

Access and allocation to basic resources is governed by the agencies set up e.g. the Water Resources Commission (WRC) was founded in 1996 to be in charge of overall regulation and management of water resources utilization. In 1997, the Public Utilities Regulatory Commission (PURC) came into being with the purpose of setting tariffs and quality standards for the operation of public utilities. Community Water and Sanitation Agency (CWSA) was established in 1998 to be responsible for management of rural water supply systems, hygiene education and provision of sanitary facilities. After the establishment of CWSA, 120 water supply systems serving small towns and rural communities were transferred to the District Assemblies and Communities to manage under the community-ownership and management scheme. Finally, pursuant to the Statutory Corporations (Conversion to Companies) Act 461 of 1993 as amended by LI 1648, on 1st July 1999, GWSC was converted into a 100% state owned limited liability, Ghana Water Company Limited, with the responsibility for urban water supply only. (Arnold et al., 2013; Government of Ghana, 2015a; Machdar et al., 2013; Opryszko et al., 2013; Yankson, 2007).

Application of the subsidiarity principle is discussed under "*Values, Principles and Policy discourses*" (Acharya, 2011; WRC, 2016).

As for the criteria defined above, property rights in relation to water are defined, as a public good. There does not seem to be a clear institutional set up for interaction between bodies both horizontally and vertically. The UN declaration on human rights does not seem to be overtly implemented, however, international cooperation with the relevant agencies as well as its acceptance seem to point to the fact that it is, at least in the process. Access and allocation seem to be governed by the three state-established agencies, however, the transparency regarding the underlying decision-making process and seems to be missing. Furthermore, information gathering, innovation and operational flexibility to respond to opportunities in real time would ideally be handled in the local level, however, information in this aspect is lacking.

Regulations and agreements

Criteria to evaluate	Score for Ghana
The rules and agreements are based on shared and agreed values	+
The rules and agreements are in conformity with the law.	+
The rules offer legal certainty regarding rights, responsibilities and accountability.	+
The rules are effective and enforceable.	0
The decision-making power is at the most appropriate level – which is different for each water-related issue, but mostly, each issue is handled at the lowest level of government and escalated appropriately, if needed.	0
The rules are transparent, and they take the distribution effect into account to avoid damage.	0
The legal system is clearly based on a legal doctrine.	+
The environmental law is well integrated into the legal system, with a pro-poor lens.	+
Descriptive water objectives are included in the water legislation.	+
Qualitative, or numeric objectives are included in the water legislation.	+
Deliberative processes are planned, on a regular basis.	0

Table 50: Results on regulations and agreements in Ghana

Legitimacy, effectiveness and enforceability would refer to whether the rules and agreements are based on shared and agreed values. Regarding this, the Ghanaian constitution ensures

us that the underlying principle of the legal system is to aim for such legitimacy, effectiveness and enforceability (Bennion, 1962).

Water related rules are not against the law, as far as the current study shows. Offering legal certainty regarding the rights, responsibilities and accountability in relation to water rules, the corresponding agencies of WCR, GWCL and CLWA do aim to provide that. The rules in relation to water are transparent in a way that they are publicly available and the same for everybody. It is not apparent how the distribution effect is considered in water governance in order to avoid damage (Bennion, 1962; Government of Ghana, 2015a, 2015b; WRC, 2016).

Regarding integration into the legal system, one needs to note that Ghana has been under British rule, thus following the common law regime, and it still follows the British juridical regime and juridical set-up. Environmental law is included in the legal system, it is included by the establishment of the Environmental Protection Agency Act of 1994 (Government of Ghana, 1994).

The descriptive objectives included in the water legislation as well as the numeric objectives cover that the coverage of the service defined in terms of people having access to the facility provided in the community is specified as follows. Regarding water: 300 persons per spout of stand post, stand pipe or borehole; 150 people per hand dug well; walking distance of not more than 500 metres from the farthest house in a community; 20 litres per capita per day minimum; water source must provide all year around supply at an acceptable quality in accordance with specifications of the Ghana Standards Board, which is in line with the World Health Organization (WHO) standard (Ministry of Works and Housing and CWSA, 2004). Regarding sanitation: household latrine is meant for an average of eight persons using one household latrine; institutional latrine is meant for an average of 50 persons per squat hole (CWSA, 2004).

As for the criteria discussed above, the rules and agreements are indirectly, via the constitution, based on shared and agreed values and are in conformity with the law. The rules offer legal certainty regarding rights, responsibilities and accountability. The rules should be effective and enforceable, about which more information would be needed. The decision-making power should be at the most appropriate level – which is different for each water-related issue, but mostly, each issue should be handled at the lowest level of government and escalated appropriately, as needed, this aspect of Ghanaian water governance would need more available information. The rules are transparent, but whether they take the distribution effect into account to avoid damage is not clear from the available information. The legal system should be clearly based on a legal doctrine, which seems to be the Anglo-Saxon common law approach, stemming from being closely associated with the UK for such a long time. The environmental law should be well integrated into the legal system, with a pro-poor lens, further research is needed on this topic. Descriptive water objectives are included in the water legislation, as well as qualitative, or numeric objectives. Whether deliberative processes are planned on a regular basis is unclear.

Financial arrangements

Criteria to evaluate financial arrangements	Score for Ghana
A mixture of solidarity, profit and polluter pays principles plays part in the water governance, with a clear and transparent decision making process leading to the actual mixture that is used in financing for this purposes.	+
Environmental pollution control is in place it is based on the polluter pays principle.	+
Environmental taxes are also in place as a financing method.	+
Crisis financing in relation to water governance is rather hard to grasp in relation to sustainable access to safe drinking water and basic sanitation, however, a crisis financing plan is in place.	0
Project financing is top-down, including the option to drive projects with private financing from bottom-up within the framework.	+

Table 51: Results on financial arrangements in Ghana

The financing of the water use is, at least partly, based on user payment, which is elaborated upon in the following tariff table:

Category of Service	Monthly Consumption (1000 litres)	Approved Rate in GHp/ 1000 litres Effective July 2015 billing cycle
Metered domestic	0-20	178.3326
	21 and above	267.3313
Commercial/ Industrial	Flat rate	380.0075
Public Institutions/ Govt. Departments	Flat rate	298.212
Unmetered Premises – Flat rate per house per month	Flat rate per house per month	1160.7090
Premises without connection (public stand pipes) Per 1000 litres		176.3036
Special commercial per 1000 litres		1080.6204

Table 52: Financing of water use in Ghana (Government of Ghana, 2015a)

Where “special commercial” refers to bulk customers who use GWCL treated water as the main raw material for bottling water for resale.

As for financing principles, it relies on the solidarity principle, using the pricing for the water for different purposes. The annual budget allocation as a percent of GDP is as follows:

Description of fund type	Water sector annual budget amount (in USD ‘000)				
	2006	2007	2008	2009	2010
Grand total	191,366	170,236	102,802	173,395	102,124
Annual GDP (nominal)	12,553,611	15,100,151	17,055,342	16,365,700	19,622,194
WSS allocation as percent of GDP	1.52%	1.13%	0.6%	1.06%	0.52%

Table 53: Budget allocations to the water sector in Ghana, 2006-2010 (Water and Sanitation Programme & UNICEF, 2015)

Environmental pollution control regarding water pollution is present, the EPA does charge environmental protection charges and fees for pollution. (Environmental Protection Council, 1988).

Political or financial crisis situations have not been found to be specifically addressed by the legislation, which is understandable, as the Community Water and Sanitation Agency Act was passed in 1998, before the 2007-8 financial crisis hit. Further research is needed to find

out how the different organizations would each address such a crisis, based on their manifestos or rules of operations.

Project financing seems to be top-down in a way that a certain part of GDP is allocated for water and sanitation projects (see above), as well as bottom-up, as the charges for use of water are charged on the final user, or the person or company applying for licences.

As for the criteria to assess this aspect of water governance, it seems to rely on the profit element and the solidarity principle, but the clear and transparent decision making process leading to the actual mixture that is used in financing for this purposes is not readily available. Environmental pollution control is present, as there is an environmental protection charge and fee for pollution, thus, based on the polluter pays principle. Whether this charge and fee can be considered a tax remains to be seen, if the state budget is readily available. Environmental taxes should also be in place as a financing method. Crisis financing in relation to water governance does not seem to be covered in the current legislation, so further research would be needed on this aspect. Project financing seems to be top-down, including the option to drive projects with private financing from bottom-up within the framework.

5.4 Implementation

Engineering and monitoring

Criteria to evaluate	Score for Ghana
The design and implementation of projects is from global design to detailed design.	+
The design and implementation correspond to the agreed SLAs.	0
The water infrastructure meets the demand for water.	-
There is an environmental monitoring system set up to ensure that the monitoring systems provide relevant and reliable data.	+
The infrastructure helps to maintain or enhance the quality of water resources for ecosystems and humans, and it ensures that aquifers are not overtaxed to points of instability.	0
The engineering and monitoring aspect coordinates resource uses and impacts within appropriate physical units.	0
Innovative approaches are considered and integrated into the already existing system.	0
There is a balance, that is accepted by the stakeholders, between enforceable standards and flexibility in local implementation.	0

Table 54: Results on engineering and monitoring in Ghana

Design and implementation of water infrastructure is carried out first in a global design and then developed into a detailed design flow, with the overall objectives and design of the water infrastructure guided by the UN guidelines (i.e. that there should be safe and accessible drinking water and basic sanitation to all), followed by the Government of Ghana's address of the issue via setting up the Ministry of Water Resources, Work and Housing (Government of Ghana, 2015b) to the different water related agencies, etc.

Practical considerations regarding engineering and monitoring include whether the water infrastructure meet the demand for water. In Ghana's case, it was reported by the 2010 UNICEF/WHO Joint Monitoring Programme (JMP) for Ghana put the use of improved water sources at 82 percent of the population, as of 2008. This would mean Ghana has already exceeded its water supply Millennium Development Goal (MDG) target of 77 percent coverage. However, provider-based figures differ significantly from those of the JMP. The Community Water and Sanitation Agency (CWSA) reports rural coverage of 57 percent in 2008, while the Ghana Water Company Ltd (GWCL) reports 58 percent as the urban water coverage. For sanitation, the survey data demonstrate very low access to improved sanitation, with the JMP reporting coverage at 13 percent in 2008, up from 7 percent in 1990

(implying an MDG target of 54 percent). Ghana will very likely miss the target for sanitation, given the predominant use of shared facilities (54 percent), which are considered unimproved according to definitions used by the JMP. By far the greatest challenge is in eliminating open defecation, which is high— 20 percent nationally and 34 percent in rural communities (Water and Sanitation Programme & UNICEF, 2015).

The monitoring from environmental perspective is done by the Environmental Protection Council, and from the water agencies' side, by the Policy Planning, Budgeting, Monitoring and Evaluation Directorate of the Ministry of Water Resources, Works and Housing (Government of Ghana, 2015b).

Sustainability aspects of engineering and monitoring are concerned whether the infrastructure helps to maintain or enhance the quality of water resources for ecosystems and humans. In the case of Ghana, the overall goal includes "environmental care" and has sustainability as one of its goals. Over-taxation of aquifers is not found to be addressed. Coordination of resource uses and impacts within appropriate physical units and accounting for interconnections can be found from time to time (Venot, Andreini, & Pinkstaff, 2011).

Innovative approaches are addressed by the Research, Statistics and Information Management Directorate within the Ministry of Water Resources, Works and Administration (Government of Ghana, 2015b). The Directorate aims to "conduct research into sectoral activities with a view to removing bottle-necks and enhancing its service delivery standards", and to "conduct research and seek for information and data to aid decision-making relevant to the achievement of sectoral objectives and goals" (Government of Ghana, 2015b).

The balance between the enforceable standards and flexibility in local implementation in regards to engineering and monitoring remains to be further examined, as information on it is not readily available.

As for the criteria to assess this aspect of water governance, the design and implementation of projects seem to be from global design to detailed design. It should correspond to the agreed SLAs, but based on the available information we cannot conclude whether this is true. The water infrastructure does not seem to meet the demand for water, considering the more pessimistic reports of the JMP, however, a more recent study may shed more light on the discrepancy between the locally reported figures and the international NGOs figures. There is an environmental monitoring system set up, but whether it provides relevant and reliable data is questionable, see the earlier comment on whether there are 82% or 57% of the population with access to drinking water and basic sanitation. The infrastructure should help to maintain or enhance the quality of water resources for ecosystems and humans, and it should ensure that aquifers are not overtaxed to points of instability, in Ghana it is addressed as "environmental care" without further elaboration, which may mean that it is all sufficiently covered, but it is not clear from this limited information. The engineering and monitoring aspect should coordinate resource uses and impacts within appropriate physical units; whether it is correctly done remains to be seen. Innovative approaches seem to be considered and integrated into the already existing system, or at least that is the aim, as implementation documents are not readily available. There should be a balance, one that is accepted by the stakeholders, as between enforceable standards and flexibility in local implementation.

Enforcement

Criteria to evaluate enforcement	Score for Ghana
There is a clear process of enforcement	+
The available enforcement is available to everybody, and it can be both public or private,	+

depending on the country's underlying cultural values.	
There are appropriate remedies available, where appropriate is defined by what the stakeholders deem as appropriate based on the underlying common values.	+
Enforcement is available via both administrative, judicial and private channels.	+
Feedback and monitoring are available together with the results for enforcement.	0
Enforcement across the country are mainly standardized with certain flexibility to consider local features – in a way that most stakeholders would agree, based on common values.	+
There are formal and informal feedback responses to policy changes that the current system would need to take into consideration as a feedback for improving the system.	0

Table 55: Results on enforcement in Ghana

Regarding the theories of enforcement, the first aspect is whether there is a clear process of enforcement and whether the available enforcement is public or private. Based on Fafchamps, approximately 10% of commercial actors went to see a lawyer in the case of a conflict with a client or supplier, on average 4% went to court, and 4% used arbitration. Interestingly, 5% also called the police in an enforcement related conflict with clients or suppliers (Fafchamps, 1996). The process of enforcement is set down as filing papers, trial and judgement and enforcement of judgement, as the public enforcement process, which takes approximately 710 days (World Bank, 2016a). The available private enforcement option, alternative dispute resolution options include the following set-up:

Alternative dispute resolution

1. Arbitration	
1.a is domestic commercial arbitration governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing substantially all its aspects?	Yes
1.b Are there any commercial disputes – aside from those that deal with public order or public policy – that cannot be submitted to arbitration?	No
1.c Are valid arbitration clauses or agreements usually enforced by the courts?	Yes
2. Mediation / Conciliation	
2.a Is voluntary mediation or conciliation available?	Yes
2.b Are mediation, conciliation or both governed by a consolidated law or consolidated chapter or section of the applicable code of civil procedure encompassing substantially all their aspects?	Yes
2.c Are there financial incentives for parties to attempt mediation or conciliation (i.e., if mediation or conciliation is successful, a refund of court filing fees, income tax credits or the like)?	No

Table 56: Alternative dispute resolution in Ghana (World Bank, 2016a)

The available remedies arise from the fact that the Courts have power to order for damages to be paid to a party where that party has proven the damages. The award of costs is discretionary, though parties may address judges on costs during assessment of costs by the Courts. Regarding interests, the Court may make an order for the payment of interest on a sum of money due to a party in the action (International Comparative Legal Guides, 2016).

Practical enforcement types are available through administrative channels. Private enforcement does not seem to be available in Ghana (Fafchamps, 1996; Jachmann, 2008).

Feedback and monitoring in relation to enforcement are discussed under "Engineering and monitoring" earlier.

Diversity of enforcement is standardized officially, local features do not seem to be present in it (Fafchamps, 1996; Government of Ghana, 2016b; Jachmann, 2008).

As for the criteria to assess this aspect of water governance, there seems to be a clear process of enforcement. The available enforcement is available to everybody, if they can afford the waiting period of almost 2 years, thus it is a skewed to favour the wealthier classes. It can be both public or private. There are remedies available, whether they are appropriate is not addressed here, as legal case studies are not available for examination. Enforcement is available via administrative channels, judicial and private channels are not

used in Ghana. Feedback and monitoring are discussed under “engineering and monitoring” as well. Enforcement across the country seems to be standardized officially, without local features. The formal and informal feedback responses to policy changes do not seem to be transparently included in the policy process.

Conflict prevention and resolution

Criteria to evaluate conflict prevention and resolution	Score for Ghana
All the following methods are accepted for conflict prevention and resolution: - mediation, - arbitration or - court proceedings, or - previously formulated mutually agreed conflict resolution processes.	+
Conflicts are primarily treated at the source, with a clear process on when and how to escalate them if needed.	0
There is a stable and reliable justice system to handle conflicts.	+
Interdisciplinary solutions are used in the case of water conflicts, where applicable.	0

Table 57: Results on conflict prevention and resolution in Ghana

Methods of conflict prevention and resolution generally would include mediation, arbitration or court proceedings in addition to previously formulated mutually agreed conflict resolution processes. Historically, alternative dispute resolution processes (ADRs) have been present in Ghana, where the settlement was through Chiefs, Elders and Heads of Families and Clans in each community. Mediation today is practiced, especially in the case of labour law related cases (Labour Act, 2003), but no evidence has been found that it is also practiced in relation to environmental issues on large.

Practical methods of conflict prevention and resolution include introduction of rules, involvement of family elders, chieftains, or the extended support group, e.g. the church community. The justice system is perceived to suffer from backlogs, slowness and expenses related to it. However, officially, the justice system is capable and prepared to handle the arising conflicts.

Interdisciplinary solutions for the prevention and solution of water conflicts need to be examined considering the types of arising interdisciplinary water conflicts that may come up, and the current legislation and practice. The official sources do not currently cover conflict resolution and prevention techniques that they prefer, thus inferring to the official conflict resolutions techniques being applied, i.e. the justice system is involved as method.

As for the criteria to assess this aspect of water governance, ADR and mediation are present in addition to court proceedings, it is not clear whether arbitration or previously formulated mutually agreed conflict resolution processes are also practiced. Conflicts should be primarily treated at the source, with a clear process on when and how to escalate them if needed, information on this seems to be not readily available. There is a stable and reliable justice system to handle conflicts, even though it suffers from serious backlogs, thus it cannot do it in a timely fashion. Interdisciplinary solutions should be used in the case of water conflicts, where applicable.

5.5 Conclusion

In conclusion, in this chapter, I reviewed the ten different aspects of water governance, and assessed its status in Ghana, considering the elaborated concepts per each aspects as developed in Chapter 2, and the operationalization developed in Chapter 3. In the following chapter, the reference country, the Netherlands, and the focus country, Ghana will be compared and contrasted in order to evaluate Ghana and highlight its strengths and weaknesses in the different aspects of water governance.

6 Comparing Ghanaian and Dutch water governance

6.1 Introduction

In the earlier chapters, the ten aspects of water governance were reviewed and their status assessed, for both the focus country, Ghana (Chapter 5) and the reference country (Chapter 4). The assessment considered the elaborated concepts per each aspects as developed in Chapter 2, and the operationalization developed in Chapter 3. In this chapter, the reference country, the Netherlands, and the focus country, Ghana will be compared and contrasted in order to evaluate Ghana and highlight its strengths and weaknesses in the different aspects of water governance, using the earlier developed criteria for this assessment.

6.2 Content

Water system knowledge analysis

Assessment criteria	NL	GH
Water systems knowledge includes per area of the lowest level of government involved (municipality) the focus area of the water system per societal function. I.e. industrial, agricultural or private use.	+	-
An overview of the changes in recent decades per five-year periods to - the natural system – possible new or disappearing rivers or lakes; - the man-made infrastructure, - the changes that involve using the same infrastructure to other functions	0	-
The actual amount or availability of - blue water and - green water,	+	+
Demographical information and changes are known.	+	+
A classification system is present that provides an overview of the quality of the available fresh water.	+	-
Classification overview is updated regularly	+	-
Resource units of water governance are known and communicated	+	+
The same unit system is used across the country	+	+
Quantitative knowledge of the water system includes - the number of rivers – with their water content, - the area of river basins, in standardized, comparable measure units, - volume of water resources, per both river basins, as well as per area of government	+	+
Considering that the river basins and the governmental units may not overlap, an overview chart of these exists.	+	-
A measure of sustainability is included in the system and is tracked throughout time	+	0

Table 58: Comparison of water system knowledge

Water systems knowledge is rather limited in Ghana. There is no readily available overview of the fresh water quality per area, nor a classification system that is applicable across the country. The strengths include the availability of water, and information on demographical changes, resource units of water governance are standardized, same units are used across the country, and there is a quantitative water governance knowledge that is available.

Values, principles, policy discourses

Criteria to evaluate values	NL	GH
There is a list of stakeholders available who are involved.	+	0
A list of common interests is available that the stakeholders agree on.	+	+
The goal to have sufficient and clean drinking water and basic sanitation to all is included in the water policy.	+	0
Water policy includes measures, deadlines and other aspects of accountability.	+	0
Sustainable and fair use is defined in the policy documents and included as a goal.	+	+
The no harm principle is either explicitly or implicitly included in the water policy document(s), with an actionable plan on how to implement it.	+	0
The available techno-scientific knowledge, as defined earlier, is be referred to when setting up water policy documents, together with the historical, cultural and socio-political aspects of water usage.	+	0
Access to drinking water and basic sanitation is considered as a universal human right, and is treated as such in the policy documents.	+	0
The public view on the topic is clear and articulated via either a national poll, or other representative work.	+	0
The country's ideology or religion is known, and has a clear attitude towards water as universal human right.	+	+
Participation of stakeholders ensure that their input would reveal the underlying framings and values regarding water.	+	0
Protection of human health and the environment is a priority, included in the constitution or other underlying basic legislation.	+	+
The way water resources are allocated among societal functions clearly reflects the underlying value system.	+	+
Water resources are explicitly protected.	+	0

Table 59: Comparison on values in water governance

Mostly, information, available knowledge is missing on the criteria established to evaluate where Ghana stands on the evaluation of values in water governance. On the strengths, where there is information available, it seems to be confirming good water governance.

Criteria to evaluate principles	NL	GH
There is sufficient decentralization to be able to address water issues at the lowest possible level of government	+	0
The system is integrated, proportionality is considered.	+	0
Public participation is included in the policy process, together with environmental principles, such as prevention and polluter pays.	+	0
Water governance is globally designed and from a big picture goal it would be further developed in detail	+	+
Both actual and virtual water flows should be considered when discussing the whole of water governance	+	+
The value of water is considered as a public good	0	+
Boundaries to benefits and costs are defined.	0	0
There is a proportional equivalence between costs and benefits.	+	0
Outcomes should be emphasised in water policies, i.e. the goal to provide sustainable access to safe drinking water and basic sanitation.	+	+
The governance structure is set up in a way that arising issues can be tackled at the source.	+	0

There is a clear system of how issues are escalated, if need be.	+	+

Table 60: Comparison of principles in water governance

The main conclusion is that information, available knowledge is missing to evaluate where Ghana stands on the evaluation of principles in water governance, however, where the information is available, it confirms good water governance practices of this aspect.

Criteria to evaluate policy discourses on	NL	GH
All viable courses of action, viewpoints and contents are considered in a policy discourse	+	0
Frame and perception are analysed in relation to what government communications reveal about policy discourses.	+	0
Voices of women and the poor, and any other marginalized groups are included in the water policy discourse, via formal or informal methods.	+	0
Underlying qualities of openness, transparency, broad participation, predictability, ethics and integrity are included in water policies	+	+
There are regular studies to check that these voices are included on an ongoing basis	0	-

Table 61: Comparison of policy discourses in water governance

On this criteria, the conclusion is similar, mainly, information, available knowledge is missing to evaluate where Ghana stands on the evaluation of policy discourses in water governance, that is signified by the lack of regular studies as well.

Stakeholders involvement

Criteria to evaluate stakeholders' involvement	NL	GH
Most groups of the society are included in the decision making progress.	+	+
All citizens with voting right are able to have a say, - directly (in a national poll) or - via representatives (via selected foremen).	+	+
There exists an overview of the groups, and a transparent overview of the decision making process, including standpoints in the beginning, result in the end, to double check which groups to what degree can influence the final outcome.		-
Stakeholder involvement can be both command-control or flexible, in relation to water governance issues, there was no clear preference to either, so in an ideal situation, it can be both, as long as the type of involvement and its depth is clear from the beginning.	+	0
The methods of stakeholder involvement include expert panels, public hearings, written statements and via follow-up from the commission.	0	0
The Aarhus Convention's aspects, i.e. (1) access to information, (2) participation in decision making and (3) access to justice, Are all available, and more explicitly, access to information is wide, easy and transparent	+	0
Public is informed over all the relevant projects and can choose to participate in it.	+	-
The public has the right to recourse procedures.	0	+
The aim of stakeholder involvement is clearly defined	+	-
Stakeholder involvement includes, among others, building knowledge, and involvement in water management.	+	+
The scale and level contests are clear and transparent, and both privilege the	0	-

environmentally most friendly choice.		

Table 62: Comparison of stakeholders' involvement in water governance

The main conclusion on this aspect as well, that information and available knowledge is missing to evaluate where Ghana stands on the evaluation of stakeholder involvement in water governance, that is signified by the lack of publicly available information, clear definitions, and lack of transparency from the available information. The strengths include the presence of democracy and the stakeholder involvement that is drawn with it.

6.3 Organization

Trade-offs between social objectives

Criteria to evaluate trade-offs	NL	GH
The agreed service-level decisions are based on trade-off of costs, benefits and distributional effects of the alternatives.	0	-
Allocating rights and responsibilities in the case of water governance is a mixture of government and market control, where governmental influence both sets the course and the overall goal, and provide opportunities for the market to act in a way to fulfil those objectives.	+	+
In a water governance discussion, the social objectives around meeting basic human needs, securing the food supply, protecting ecosystems, sharing water resources, managing risks, valuing water and governing water wisely, are all considered,	+	0
When focusing on sustainable access to safe drinking water and basic sanitation, these are given more significant weight.	+	0

Table 63: Comparison of trade-offs between social objectives in water governance

On the aspect regarding trade-offs between social objectives, the main conclusion is similar, mostly information and available knowledge is missing to evaluate where Ghana stands, such as the lack of availability of service-level agreements, and lack of publicly available discussion on the topic. The strength in trade-offs is the presence of both government and market actors.

Responsibility, authority, means

Criteria to evaluate	NL	GH
Property rights in relation to water are defined, most likely as a public good.	+	+
There is a clear institutional set up for interaction between bodies both horizontally and vertically.	+	/
The UN declaration on human rights is implemented, and it is stated in policy that access to water is considered a basic human right.	+	/
Access is provided based on a democratic decision-making process	+	+
The process is regulated with a wide involvement of stakeholders in a transparent and democratic manner	+	/
Information gathering, innovation and operational flexibility to respond to opportunities in real time is ideally handled in the local level.	+	/

Table 64: Comparison of responsibility, authority and means in water governance

The main conclusion on this aspect of water governance is also that information and available knowledge is missing to evaluate where Ghana stands on the evaluation of responsibility, authority and means in water governance, in several aspects of this topic. Property rights are defined, as public good, which is a good first step regarding this aspect of water governance.

Regulations and agreements

Criteria to evaluate	NL	GH
The rules and agreements are based on shared and agreed values	+	+
The rules and agreements are in conformity with the law.	+	+
The rules offer legal certainty regarding rights, responsibilities and accountability.	+	+
The rules are effective and enforceable.	+	0
The decision-making power is at the most appropriate level – which is different for each water-related issue, but mostly, each issue is handled at the lowest level of government and escalated appropriately, if needed.	+	0
The rules are transparent, and they take the distribution effect into account to avoid damage.	+	0
The legal system is clearly based on a legal doctrine.	+	+
The environmental law is well integrated into the legal system, with a pro-poor lens.	+	+
Descriptive water objectives are included in the water legislation.	+	+
Qualitative, or numeric objectives are included in the water legislation.	+	+
Deliberative processes are planned, on a regular basis.	0	0

Table 65: Comparison of regulations and agreements in water governance

In conclusion, similarly to the earlier, information and available knowledge is missing on the criteria established to evaluate where Ghana stands on the evaluation of regulations and agreements in water governance, in several aspects of this topic. The aspects of regulations and agreements that are covered by already available information are pointing towards strong water governance practices.

Financial arrangements

Criteria to evaluate financial arrangements	NL	GH
A mixture of solidarity, profit and polluter pays principles plays part in the water governance, with a clear and transparent decision making process leading to the actual mixture that is used in financing for this purposes.	+	+
Environmental pollution control is in place it is based on the polluter pays principle.	+	+
Environmental taxes are also in place as a financing method.	+	+
Crisis financing in relation to water governance is rather hard to grasp in relation to sustainable access to safe drinking water and basic sanitation, however, a crisis financing plan is in place.	0	0
Project financing is top-down, including the option to drive projects with private financing from bottom-up within the framework.	+	+

Table 66: Comparison of financial arrangements in water governance

Most of the financial arrangements aspects show a strong water governance practice in Ghana. The only aspect where Ghana is lacking is the crisis financing, however, for this aspect, the Netherlands, with which the comparison is made, is also lacking. Further, I note here the difference of capabilities in terms of financial stability and strength of the two countries, which would also play a role in the strength and weaknesses of water governance

6.4 Implementation

Engineering and monitoring

Criteria to evaluate	NL	GH
The design and implementation of projects is from global design to detailed design.	+	+
The design and implementation correspond to the agreed SLAs.	+	0

The water infrastructure meets the demand for water.	+	-
There is an environmental monitoring system set up to ensure that the monitoring systems provide relevant and reliable data.	0	+
The infrastructure helps to maintain or enhance the quality of water resources for ecosystems and humans, and it ensures that aquifers are not overtaxed to points of instability.	+	0
The engineering and monitoring aspect coordinates resource uses and impacts within appropriate physical units.	0	0
Innovative approaches are considered and integrated into the already existing system.	0	0
There is a balance, that is accepted by the stakeholders, between enforceable standards and flexibility in local implementation.	+	0

Table 67: Comparison of engineering and monitoring in water governance

Similar to the earlier water governance aspects, in this regards as well, information and available knowledge is missing to evaluate where Ghana stands on the evaluation of engineering and monitoring in water governance, in several aspects of this topic. The outstanding weakness is the water infrastructure's ability to meet the demand for water in Ghana, whereas, its strengths lie in the set-up of the design and implementation as well as the existence of the environmental monitoring system.

Enforcement

Criteria to evaluate enforcement	NL	GH
There is a clear process of enforcement	+	+
The available enforcement is available to everybody, and it can be both public or private, depending on the country's underlying cultural values.	+	+
There are appropriate remedies available, where appropriate is defined by what the stakeholders deem as appropriate based on the underlying common values.	+	+
Enforcement is available via both administrative, judicial and private channels.	+	+
Feedback and monitoring are available together with the results for enforcement.	+	0
Enforcement across the country are mainly standardized with certain flexibility to consider local features – in a way that most stakeholders would agree, based on common values.	+	+
There are formal and informal feedback responses to policy changes that the current system would need to take into consideration as a feedback for improving the system.	+	0

Table 68: Comparison of enforcement in water governance

As earlier, in this aspect as well the main weakness is that information and available knowledge is missing to evaluate where Ghana stands on the evaluation of enforcement in water governance, in several aspects of this topic. The clear strengths are in the clarity of process, the availability of enforcement, availability of remedies and the standardization of enforcement across country. Practical aspects of these would be useful to delve into deeper.

Conflict prevention and resolution

Criteria to evaluate conflict prevention and resolution	NL	GH
All the following methods are accepted for conflict prevention and resolution: - mediation, - arbitration or - court proceedings, or - previously formulated mutually agreed conflict resolution processes.	+	+
Conflicts are primarily treated at the source, with a clear process on when and how to escalate them if needed.	+	0
There is a stable and reliable justice system to handle conflicts.	+	+

Interdisciplinary solutions are used in the case of water conflicts, where applicable.	+	0

Table 69: Comparison of conflict prevention and resolution in water governance

As earlier, on this aspect of water governance as well, the main weakness is that information and available knowledge is missing to evaluate where Ghana stands on the evaluation of conflict prevention and resolution in water governance, in several aspects of this topic. Clear strengths are the availability of different methods of conflict prevention and resolution and the availability of the justice system.

6.5 Conclusion

In the above, I compared the Ghanaian and the Dutch water governance along the criteria established earlier, in order to highlight the strengths and weaknesses of the Ghanaian water governance system, with a focus on the sustainable access to safe drinking water and basic sanitation. As it was clear to see, in most cases, the weakness of the Ghanaian water governance lies in the lack of information or available knowledge on certain aspects of it, whereas, the Dutch water governance is rather strong in this area. One aspect that highlighted a weakness in both countries' water governance is the availability of crisis financing, which seems to be a topic that neither country has readily available information on at the moment.

7 Conclusion, discussion and recommendations

7.1 Introduction

My main question to answer in this thesis revolved around the strengths and weaknesses are in the Ghanaian water governance, in comparison with the Dutch water governance, with special focus on the question of sustainable access to safe drinking water and basic sanitation. In the above, after an introduction of the problem context, and the knowledge gap to address, I reviewed the relevant scientific literature in order to conceptualize what good water governance means. Further, there followed a discussion of the methodology of this thesis, including operationalization of criteria and data collection methods. Next, I established the frame of reference by applying all these criteria and measurements to the benchmark case of the Netherlands. After that, the relevant details of the focus country, Ghana, were discovered and described. A comparison of the two countries followed, which enabled me to highlight the areas of strengths and weaknesses that Ghana has in the field of water governance, with a focus on sustainable access to basic sanitation and safe drinking water.

This research contributed in two major ways to scientific literature in general. Firstly, by developing in more detail the conceptualization and operationalization of the van Rijswick water governance framework (2014), with a focus on sustainable access to basic sanitation and safe drinking water. Secondly, by providing an overview of the current knowledge about Ghanaian water governance, including the areas where more research would be needed to establish a thorough view of it, with a focus on the level of sustainability. Further, it expanded the testing of the research framework by applying it to another country, after Dai (2015).

7.2 Limitations of research

The main research question, *(w)hat are the strengths and weaknesses of Ghana's water governance in terms of sustainable access to safe drinking water and basic sanitation when comparing to the industry best practice that is represented by the Dutch water governance,* was a very ambitious one to answer. However, it was a balanced pairing with the global view of the water governance framework used for its assessment. Considering the limited availability of interview subjects, the question arises whether it would have been wiser to conduct a case study in one specific area of Ghana, for example, to be able to have access via a deeper dive to more detailed information on the water governance, alas, in that specific area only. I have considered it; however, as the goal of this research was to provide an

overview of the country's water governance, with a special focus on sustainable access to basic sanitation and safe drinking water, and considering the enormous differences in development across the country, it would have provided a skewed picture.

Naturally, errare humanum est, and in this case, it is manifested in the limitations of the research. Firstly, as a result of my previously existing expertise in the fields of commerce, finance and management, certain aspects of the ten building blocks approach may be less thoroughly developed than others.

Secondly, reliability of the research would be limited by the fact that it is conducted once, over a short period of time, by one researcher, thus its reliability can be increased by repeated research after some time has passed, or conducting by a different researcher, or a research team. Validity of the research is lower than expected, as a result of the limited availability of the data, although the research framework used for the assessment has already been tested by e.g. Dai (2015).

Thirdly, as there is no ideal world situation exiting, a frame of reference had to be chosen, and the choice was the Netherlands. However, the two countries are not only different on their water governance, ceteris paribus. Thus the other limitation of the research is, whether it is fair to compare a developed and a developing country with such different background and history on one aspect, and how to balance against differences that are not caused by differences in water governance. I appreciate this difference, and am aware of their existence, but in this research, could not address them.

Fourth, the available sources were mostly published by the governments of each country, thus possibly limiting the view of the water governance of each country. Availability of more diverse sources would have increased the reliability of my research.

Finally, that an important aspect of sustainable access is the question on how less privileged groups in society are involved, represented, however, information on either gender divide or wealth was unavailable.

7.3 Strengths and weaknesses of water governance in Ghana

Based on the above, sustainable access to basic sanitation and safe drinking water in Ghana is limited by the lack of available, transparent information about a significant number of aspects of water governance, such as: overview of the fresh water quality per area, or a classification system that is applicable across the country; clear definitions; lack of transparency from the available information. Further weakness is the lack of availability of service-level agreements, and lack of public discussion on the topic. Also, the water infrastructure's inability to meet the demand for water in Ghana, is an additional weakness, as well as the lack of information on the practical aspects of enforcement.

On the other hand, Ghanaian water governance also has a number of strengths, including the presence of democracy and the stakeholder involvement that is drawn with it. The strength in trade-offs is the presence of both government and market actors. Property rights are defined, as public good, which is a good first step regarding this aspect. The set-up of the design and implementation as well as the existence of the environmental monitoring system are also strengths of the system. Further strengths are in the clarity of process, the availability of enforcement, availability of remedies and the standardization of enforcement across country. Also, the availability of different methods of conflict prevention and resolution and the availability of the justice system are additional strengths in the Ghanaian water governance.

7.4 Recommendations for Ghana

The main recommendation for Ghana, based on the research carried out would be development of further knowledge in a number of aspects of water governance, as detailed above, in order to be able to evaluate its current strengths and weaknesses in more depth. Further, setting up processes of public discussion would make it possible to strengthen many other aspects of water governance as well – from getting clearer input on the values and principles, to more engaged stakeholder involvement, to clearing up questions about responsibilities, authorities and means, and leading to more effective conflict prevention and resolution as well.

7.5 Recommendations for future research

Even though, many aspects and a high level overview of the Ghanaian water governance was discussed above, certain aspects and topics in relation to it would call for possible further research. Firstly, if the above recommendations are considered, a follow-up research to be able to review the change in status, either as results from the recommended actions, or to explain changes or lack thereof over time.

Secondly, consider further indicators for the measurement of the different building blocks to get a more sophisticated picture on the situation of sustainable access to safe drinking water and basic sanitation.

A third possibility is to refine the framework used, by developing an ideal world scenario based on comparison of more countries, or blocks of countries to balance against cultural, historical, economical or other base differences.

A further possibility, is regarding the van Rijswick approach (2014) that was used as theoretical framework to analyse the water governance with focus on the sustainable access to basic sanitation and safe drinking water in Ghana, was developed as a high level theoretical framework to address overall water governance. As such, it had the strength of providing a thorough global view and a global approach. From this strength resulted the two areas in which the framework could be further developed, that are both crucial when using it to apply to a given focus area, both geographical and within water governance topics. Firstly, the framework does not include any details on either conceptualization of its ten building blocks, or operationalization of them, staying in the very high level concepts about each of its building blocks. Secondly, all assessments need a benchmark to assess against, but this framework, fails to provide that. In all fairness, it needs to be added, that these two areas are ones that the developers of the framework never aspired to include, so their inclusion would be another, more practice oriented framework altogether.

Finally, even though this research was able to establish the theoretical strength, weaknesses and missing spots of the Ghanaian water governance, however, a field research to test their practical availability would contribute significantly to the current research.

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Appendices

Appendix I: Organizations approached regarding Ghana's water governance

Organization name	Category	Reached out to	Done	Decline	No response	Not relevant/ no email
Action Aid	Int'l NGO	x				x
Catholic Relief Services	Int'l NGO	x				
CONIWAS	Ghana/ LNGO	x			*x*	
CWSA	Local Gov	x			x	
Delft University	NL/ University	x				
EDSAM	Ghana/ LNGO	x			*x*	
GhanaWash	Ghana/ LNGO	x			x	
Greenpeace	Int'l NGO	x			x	
GWCL	Local Gov	x			x	
IRC Wash	Int'l NGO	x			x	
NAWA	Residents	x				
Safe Water NW	Int'l NGO	x			x	
Unicef	Int'l NGO	x				
University of Ghana	University	x			x	
ViaWater	NL	x				
WaterAid Ghana	Int'l NGO	x				
WHO	Int'l NGO	x			x	
World Bank	Int'l NGO	x				
World Vision Ghana	Int'l NGO	x			x	
WRC	Local Gov	x			x	
Total		**20**	**0**	**0**	**12**	**1**

Appendix II: Individuals approached regarding Ghana's water governance

Individuals selected based on Scopus search who published scientific papers in the past years about certain aspects of Ghanaian water governance.

Last name	First name	Reached out to	Sent questionnaire	Email not working	Decline	No response	Done
Abor	Joshuah	x	x			x	
Acheampong	E.N.	x	x				
Adinyira	Emmanuel	x	x			x	
Aikins	Moses	x	x			x	
Akweongo	Patricia	x	x		x		
Ameyaw	Ernest	x	x				
Amisigo	Barnabas	x	x				
Amoah	Albert	x		X			
Awuah	Esi	x			x		
Badu	Edward	x		X			
Bawole	Justice	x	x			x	
Bertrand	William	x	x			x	
Bokpin	Godfred Alufar	x	x			x	
Chan	Albert	x	x			x	
De Buhr	Elke	x	x			x	
Elands	Brigit	x		X			
Hansen	C.P.	x			x		
Kyereboah-Coleman	Anthony	x		X			
McIntyre	Diane	x			x		
Mensah	John Victor	x	x			x	
Mohan	Giles Marcus	x	x			x	
Nissanke	M.K.	x			x		
Nudzor	Hope, Prius	x		X			
Nyarko	K.B.	x	x				
Owusu	Peter	x	x			x	
Owusu-Manu	DeGraft	x	x			x	
Ramcilovic – Suominen		x		X			
Reed	Holly	x	x		x		
Suleiman	Lina	x	x			x	
Teye	J.K.	x	x			x	
Theobald	Sally Jane	x			x		
Tolhurst	Rachel	x	x			x	
Visser	B.J.	x		X			
Total		33		7	7	15	0

Appendix III: Individuals and organizations approached regarding the Netherlands' water governance

Last name	First name	Reached out to	Sent questionnaire	Email not working	Decline	No response	Done
Van Leeuwen	Kees	x	x				1
Rijswick	M	x				x	
Vewin	(org)	x	x			x	

Appendix IV: Questionnaire(s) on Ghana's water governance

Introduction (on all individual questionnaires)

What connects you to Ghanaian (water) governance? *
Please give a short background information on your connection to Ghanaian (water) governance, e.g. member of X organization, specializing in Y; degree in X focusing on Y.

How long have you been focusing on Ghanaian (water) governance? *
Please give your response in years.

1 Water system knowledge

– including geographical knowledge, historical and cultural aspects

How well do you find that the national water system fulfils its industrial function?
0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the national water system fulfils its agricultural function?0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the national water system fulfils its private use function?0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the recent changes in the natural water system? Including changes in the number of rivers, lakes, resulting both from man-made changes and natural processes. 0: find it unsatisfactory 10: find it satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the recent changes in the water infrastructure? Including changes in the infrastructure, in the usage of the same infrastructure. 0: find it unsatisfactory 10: find it satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the available supply of drinking water in the country?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the access to basic sanitation in the country?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How would you rate the percentage of the population who has access to sustainable drinking water and basic sanitation?0: needs immediate improvement 10: satisfactory percentage

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How would you rate the geographical differences of access to sustainable drinking water and basic sanitation in the country?0: significant differences across the country 10: no significant differences across the country

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How satisfactory you find the water classification system in place in the country?0: needs immediate improvement 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How would you rate the ecological aspects considered in the local water governance, e.g. sustainability of the system?
0: needs immediate improvement 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How would you rate the overall water systems knowledge aspect of water governance in Ghana?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any further comments on this topic?
Is there anything further you would like to mention in relation to water systems knowledge in Ghana, especially with relation to availability of drinking water and basic sanitation?

Would you be willing to answer a few short questions on your responses above? *
ive so, please let me know your email address where I can reach you most easily. Thank you for filling out this questionnaire.

2 Values, principles, policy discourses

Values

The below questions are related to values. We understand values as dependent on historical, cultural, normative and political views, value is something that is treasured, something of importance. Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What is considered as common interest in relation to water?

How is the availability of sufficient and clean drinking water and basic sanitation to all included in the water policy, if at all?
Is it one of the underlying values?

How is the idea of sustainable and fair use of resources embedded in water policy?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How is the no harm principle considered in the water policy documents, if at all?
"no harm principle “meaning, that if a policy has a suspected risk of causing harm to the environment, the burden of proof that it is not harmful falls on those promoting the policy.

In water policy is both the techno-scientific knowledge, and also the historical, cultural, socio-political aspects considered? If yes, how?

How is access to drinking water and basic sanitation considered in the water policy?
As a public good, as a universal human right, as a private good/ privilege?

What is the public view on access to drinking water and basic sanitation?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What is the country’s leading or most influential ideology or religion, if any such exist?
If this has any relevant teachings on access to drinking water and basic sanitation, please include.

How do you find the allocation of water resources among societal functions?
0: absolutely inappropriate 10: completely appropriate

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the protection of human health and the environment is included in the legislation?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are water resources protected?

0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Ghanaian values? *
Especially in relation to access to drinking water and basic sanitation?

Principles

Principles are more general in character, they are the underlying fundaments from which values are drawn, they can be interpreted via reading between the lines of policies. Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What would you consider the main the underlying principles of water governance in Ghana?
Centralized vs. decentralized? Hierarchical vs. non-hierarchical? Proportionality considered vs not? Public participating or not? In what way is prevention considered? How are polluters of water resources required to pay for their pollution? How is the water system design developed, global design focused or detailed design focused?

In water policies related to access to drinking water and basic sanitation, how thoroughly are all water flows considered?
I.e. actual and virtual water flows as well? 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are boundaries defined?
Is there a proportional equivalence between benefits and costs?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are the outcomes of access, livelihood, social structures and political voice considered in the water policies?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are water-related issues handled?
Are arising issues considered at the appropriate level? Is the system of escalating issues regarding access to drinking water and basic sanitation working well?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Ghanaian principles? *
Especially in relation to access to drinking water and basic sanitation?

Policy discourses

Policy discourses can be understood as the different ensembles of actors with specific storylines, frames, values, principles that emphasize certain aspects. Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What are the main courses of action, viewpoints, contents *included* in the policy process?

What are the main courses of action, viewpoints, contents *excluded* of the policy process?

How well are the voices of women and the poor and any other marginalized groups included in the water policy discourse?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are underlying qualities included in the water policies?
E.g. openness, transparency, broad participation, predictability, ethics and integrity. 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the state's involvement in water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the inclusion of values, principles and policy discourses in water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Ghanaian policy discourses? *
Especially in relation to access to drinking water and basic sanitation?

3 Stakeholders involvement

Which groups of the society are included in the decision-making progress? What percentage of the population does this cover?

How do you rate the inclusion of groups of the society in the decision-making progress?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree can these groups influence the final outcome of a change/ introduction of a water policy?
How does this influence differ group by group?

To what degree can the *most* influential group influence the final outcome of a change/ introduction of a water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree can the *least* influential group influence the final outcome of a change/ introduction of a water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How flexible or rigid is stakeholder involvement?
0: completely rigid 10: completely flexible

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What methods of stakeholder involvement are present? Please note by each the depth of their involvement or the weight of their conclusions.
E.g. expert panels, public hearings, written statements of via follow-up from the commission

Please elaborate on the presence of access to information
0: not satisfactory at all/ total absence 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Please elaborate on the presence, absence or level of participation in decision making
0: not satisfactory at all/ total absence 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Please elaborate on the presence or absence of access to justice
0: not satisfactory at all/ total absence 10: completely satisfactory

1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

What is the aim of stakeholder involvement?
E.g. Building knowledge? Involvement in water management? Other?

What scale does the current water management system privilege?
E.g. administrative, hydrological, ecosystem, or economic boundaries?

What level does the current water management system privilege?
E.g. sub-district or the province, the tributary watershed or the international river basin, a river or a biogeographic region, and the local or the regional economy?

How would you rate the overall stakeholders' involvement aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on stakeholders' involvement in Ghanaian water policy?
Especially in relation to access to drinking water and basic sanitation?

4 Trade-offs between social objectives

Trade-offs between social objectives are understood as the allocation and reallocation of scarce resources, as a result of allocation mechanisms (van Rijswick et al, 2014).

How are trade-offs negotiated?
Agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives

How are trade-offs in water policy negotiated?
E.g. are agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives?

What are the procedures to allocate rights and responsibilities?
E.g. Government controlled? Market controlled? mixture?

How are social objectives considered in water policy? *
How well are the following focal points considered when trading off between social objectives:

	0: not at all	1	2	3	4	5	6	7	8	9	10: perfectly
(i) meeting basic (human) needs											
(ii) securing the food supply											
(iii) protecting ecosystems											
(iv) sharing water resources											
(v) managing risks											
(vi) valuing water											

	0: not at all	1	2	3	4	5	6	7	8	9	10: perfectly
(vii) governing water wisely											

Please elaborate on your above ratings.

How would you rate trade-offs between social objectives in water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactorily in relation to access to drinking water and basic sanitation?

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on trade-offs in Ghanaian water policy?
Especially in relation to access to drinking water and basic sanitation?

5 Responsibility, authority, means

How do the different water governing bodies interact, how is the institutional set-up horizontally and vertically?

How would you rate the interaction between different water governing bodies?
0: very poor 10: excellent

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How well is the UN declaration on human rights implemented to consider water as a human right?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How well is access provided to basic resources, how well is the process regulated?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the allocation of available resource (procedure) work?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

At which level are the information gathering, innovation and operational flexibility to respond to opportunities in real time handled?
E.g. locally, regionally, or on a national level.

How would you rate the responsibility, authority and means aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on responsibility, authority and means in Ghanaian water policy? *
Especially in relation to access to drinking water and basic sanitation?

6 Regulations and agreements

To what degree are the rules and agreements on water governance, esp. with respect to access to drinking water and basic sanitation based on shared and agreed values?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

To what degree do they offer legal certainty regarding rights, responsibilities and accountability?

0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

To what degree are rules effective and enforceable?

0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

To what degree is the decision-making power at the most appropriate level?

0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

To what degree are the rules transparent?

0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How is the environmental law integrated into the legal system?

How well is the environmental law integrated into the legal system?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What are the narrative, i.e. descriptive objectives included in the water legislation?
Especially with regards to access to drinking water and basic sanitation

What are the numeric, i.e. qualitative objectives included in the water legislation?
Especially with regards to access to drinking water and basic sanitation

How are conversations planned?
Are they planned forms of engagements or impromptu?

How would you rate the overall regulations and agreements aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on regulations and agreements in Ghanaian water policy? *
Especially in relation to access to drinking water and basic sanitation?

7 Financial arrangements

Which principle(s) does the water finance follow?
Solidarity, profit, or polluter pays, or a mixture – if so, how is it decided which part is financed in which way?

Environmental pollution control – is it applicable in Ghana? If so, how is it financed?

Are there environmental taxes, if so, any of them aimed at water pollution?

How would the country's current political and financial system react to a political/ financial crisis?

How are water related projects aimed at sustainable access to drinking water and basic sanitation financed?
Top-down or bottom up, or something different?

How would you rate the overall financial arrangements aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on financial arrangements in Ghanaian water policy? *
Especially in relation to access to drinking water and basic sanitation?

8 Engineering and monitoring

How is the design and implementation of water infrastructure carried out?
From global design to detailed design? How does it connect to any agreed Service Level Agreements (SLAs)?

How well does the water infrastructure construction meet the demand for water?
Especially in the case of access to drinking water and basic sanitation? 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How is the environmental monitoring system set up?
I.e. regarding both administrative set-up (number of tiers, branches, etc.) and the legal regulations that ensure that monitoring systems include reliable data?

How well do you think the environmental monitoring system is set up?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the infrastructure help to maintain or enhance the quality of water resources for ecosystems and humans?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does water infrastructure ensure aquifers are not over-taxed to points of instability?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the system coordinate resource uses and impacts within appropriate physical units, to account for interconnections between surface- and ground-water?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are the innovative approaches integrated into the already existing system?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Where is the balance in the engineering and monitoring between enforceable standards and flexibility in local implementation?

How would you rate the overall engineering and monitoring aspect of water governance in Ghana? *

0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on engineering and monitoring in Ghanaian water policy? *

Especially in relation to access to drinking water and basic sanitation?

9 Enforcement

In order to close the policy cycle from participation, formulating goals, rules and standards and how to make decisions, enforcement is essential to ensure actual achievement of goals. Lack of enforcement will make the water management less efficient. Rules made based on shared values and principles would be easier to enforce as parties would have a strong conviction that they should behave in conformity with the rules. There is a difference between public and private enforcement, in both cases, it is important to know what are the available remedies to achieve the objectives.

How clear would you rate the process of enforcement?

0: not clear at all 10: completely clear

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Is the available enforcement public or private enforcement?

What are the available remedies?

How is enforcement available?

- Via administrative channels
- Via judicial channels
- Via private means
- Other:

Is feedback and monitoring available, together with results in enforcement?
If so, in what form, and what frequency?

How is enforcement regulated?

- It is standardized
- It is flexible, to account for local differences
- Other:

What are the formal and informal responses to policy changes in the current system?

How would you rate the overall enforcement aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on enforcement in Ghanaian water policy? *
Especially in relation to access to drinking water and basic sanitation?

10 Conflict prevention and resolution

How accepted are the below methods for conflict prevention and resolution in Ghana? *
0: not at all 10: completely

	0	1	2	3	4	5	6	7	8	9	10
Mediation											
Arbitration											
Court proceedings											
Previously formulated mutually agreed											

	0	1	2	3	4	5	6	7	8	9	10
conflict resolution processes											
Traditional processes											

Please elaborate on your above ratings.

Are conflicts treated at the source?

Please elaborate on the above.

How would you rate the stability and reliability of the justice system to handle conflicts?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How are interdisciplinary solutions used in the case of water conflicts?

How would you rate the overall conflict prevention and resolution aspect of water governance in Ghana? *
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on conflict prevention and resolution in Ghanaian water policy? *
Especially in relation to access to drinking water and basic sanitation?

* * *

Would you be willing to answer a few short questions on your responses above? *
If so, please let me know your email address where I can reach you most easily. Thank you for filling out this questionnaire.

Links to online questionnaires by topic:

Water systems knowledge
Values, principles, policy discourses
Stakeholders involvement
Trade-offs between social objectives
Responsibility, authority, means
Regulations and agreements
Financial agreements
Engineering and monitoring
Enforcement
Conflict prevention and resolution

Appendix V: Questionnaire(s) on the Netherlands' water governance

What connects you to Dutch (water) governance?
Please give a short background information on your connection to Dutch (water) governance, e.g. member of X organization, specializing in Y; degree in X focusing on Y.

How long have you been focusing on Dutch (water) governance?
Please give your response in years.

1 Water systems knowledge

How well do you find that the national water system fulfils its industrial function?0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the national water system fulfils its agricultural function?
0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the national water system fulfils its private use function?
0: none at all; 10: perfectly.

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the recent changes in the natural water system?
Including changes in the number of rivers, lakes, resulting both from man-made changes and natural processes. 0: find it unsatisfactory 10: find it satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the recent changes in the water infrastructure?
Including changes in the infrastructure, in the usage of the same infrastructure. 0: find it unsatisfactory 10: find it satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the available supply of drinking water in the country?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the access to basic sanitation in the country?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the percentage of the population who has access to sustainable drinking water and basic sanitation?0: needs immediate improvement 10: satisfactory percentage

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the geographical differences of access to sustainable drinking water and basic sanitation in the country?
0: significant differences across the country 10: no significant differences across the country

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How satisfactory you find the water classification system in place in the country?
0: needs immediate improvement 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the ecological aspects considered in the local water governance, e.g. sustainability of the system?0: needs immediate improvement 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the overall water systems knowledge aspect of water governance in the Netherlands?

0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any further comments on this topic?

Is there anything further you would like to mention in relation to water systems knowledge in the Netherlands, especially with relation to availability of drinking water and basic sanitation?

2 Values, principles, policy discourses

Values

The below questions are related to values. We understand values as dependent on historical, cultural, normative and political views, value is something that is treasured, something of importance. Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What is considered as common interest in relation to water?

How is the availability of sufficient and clean drinking water and basic sanitation to all included in the water policy, if at all?

Is it one of the underlying values?

How is the idea of sustainable and fair use of resources embedded in water policy?

0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How is the no harm principle considered in the water policy documents, if at all?

"no harm principle" meaning, that if a policy has a suspected risk of causing harm to the environment, the burden of proof that it is not harmful falls on those promoting the policy.

In water policy is both the techno-scientific knowledge, and also the historical, cultural, socio-political aspects considered? If yes, how?

How is access to drinking water and basic sanitation considered in the water policy?
As a public good, as a universal human right, as a private good/ privilege?

What is the public view on access to drinking water and basic sanitation?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What is the country's leading or most influential ideology or religion, if any such exist?
If this has any relevant teachings on access to drinking water and basic sanitation, please include.

How do you find the allocation of water resources among societal functions?
0: absolutely inappropriate 10: completely appropriate

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well do you find that the protection of human health and the environment is included in the legislation?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are water resources protected?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Dutch values?
Especially in relation to access to drinking water and basic sanitation?

Principles

Principles are more general in character, they are the underlying fundaments from which values are drawn, they can be interpreted via reading between the lines of policies. Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What would you consider the main the underlying principles of water governance in the Netherlands?
Centralized vs. decentralized? Hierarchical vs. non-hierarchical? Proportionality considered vs not? Public participating or not? In what way is prevention considered? How are polluters of water resources required to pay for their pollution? How is the water system design developed, global design focused or detailed design focused?

In water policies related to access to drinking water and basic sanitation, how thoroughly are all water flows considered?
I.e. actual and virtual water flows as well? 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are boundaries defined?
Is there a proportional equivalence between benefits and costs? 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are the outcomes of access, livelihood, social structures and political voice considered in the water policies?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are water-related issues handled?
Are arising issues considered at the appropriate level? Is the system of escalating issues regarding access to drinking water and basic sanitation working well?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Dutch principles?
Especially in relation to access to drinking water and basic sanitation?

Policy discourses

Policy discourses can be understood as the different ensembles of actors with specific storylines, frames, values, principles that emphasize certain aspects.
Please consider these in relation to water (governance) with a special emphasis on access to drinking water and basic sanitation.

What are the main courses of action, viewpoints, contents *included* in the policy process?

What are the main courses of action, viewpoints, contents *excluded* of the policy process?

How well are the voices of women and the poor and any other marginalized groups included in the water policy discourse?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are underlying qualities included in the water policies?
E.g. openness, transparency, broad participation, predictability, ethics and integrity.
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the state's involvement in water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How would you rate the inclusion of values, principles and policy discourses in water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on the Dutch policy discourses?
Especially in relation to access to drinking water and basic sanitation?

3 Stakeholders involvement

Which groups of the society are included in the decision-making progress? What percentage of the population does this cover?

How do you rate the inclusion of groups of the society in the decision-making progress?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree can these groups influence the final outcome of a change/ introduction of a water policy?
How does this influence differ group by group?

To what degree can the *most* influential group influence the final outcome of a change/ introduction of a water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree can the *least* influential group influence the final outcome of a change/ introduction of a water policy?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How flexible or rigid is stakeholder involvement?
0: completely rigid 10: completely flexible

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What methods of stakeholder involvement are present? Please note by each the depth of their involvement or the weight of their conclusions.
E.g. expert panels, public hearings, written statements of via follow-up from the commission

Please elaborate on the presence of access to information
0: not satisfactory at all/ total absence 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Please elaborate on the presence, absence or level of participation in decision making
0: not satisfactory at all/ total absence 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Please elaborate on the presence or absence of access to justice
0: not satisfactory at all/ total absence 10: completely satisfactory

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What is the aim of stakeholder involvement?
E.g. Building knowledge? Involvement in water management? Other?

What scale does the current water management system privilege?
E.g. administrative, hydrological, ecosystem, or economic boundaries?

What level does the current water management system privilege?
E.g. sub-district or the province, the tributary watershed or the international river basin, a river or a biogeographic region, and the local or the regional economy?

How would you rate the overall stakeholders' involvement aspect of water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on stakeholders' involvement in Dutch water policy?
Especially in relation to access to drinking water and basic sanitation?

4 Trade-offs between social objectives

Trade-offs between social objectives are understood as the allocation and reallocation of scarce resources, as a result of allocation mechanisms (van Rijswick et al, 2014).

How are trade-offs negotiated?
Agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives

How are trade-offs in water policy negotiated?
E.g. are agreed service-level decisions are based on trade-offs of costs, benefits and distributional effects of the different alternatives?

What are the procedures to allocate rights and responsibilities?
E.g. Government controlled? Market controlled? mixture?

How are social objectives considered in water policy?
How well are the following focal points considered when trading off between social objectives:

	0: not at all	1	2	3	4	5	6	7	8	9	10: perfectly
(i) meeting basic (human) needs	○	○	○	○	○	○	○	○	○	○	○
(ii) securing the food supply	○	○	○	○	○	○	○	○	○	○	○
(iii) protecting ecosystems	○	○	○	○	○	○	○	○	○	○	○

	0: not at all	1	2	3	4	5	6	7	8	9	10: perfectly
(iv) sharing water resources											
(v) managing risks											
(vi) valuing water											
(vii) governing water wisely											

Please elaborate on your above ratings.

How would you rate trade-offs between social objectives in water governance in the Netherlands?
Especially in relation to access to drinking water and basic sanitation? 0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on trade-offs in Dutch water policy?
Especially in relation to access to drinking water and basic sanitation?

5 Responsibility, authority, means

How do the different water governing bodies interact, how is the institutional set-up horizontally and vertically?

How would you rate the interaction between different water governing bodies?0: very poor 10: excellent

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How well is the UN declaration on human rights implemented to consider water as a human right?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well is access provided to basic resources, how well is the process regulated?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the allocation of available resource (procedure) work?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

At which level are the information gathering, innovation and operational flexibility to respond to opportunities in real time handled?
E.g. locally, regionally, or on a national level.

How would you rate the responsibility, authority and means aspect of water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on responsibility, authority and means in Dutch water policy?
Especially in relation to access to drinking water and basic sanitation?

6 Regulations and agreements

To what degree are the rules and agreements on water governance, esp. with respect to access to drinking water and basic sanitation based on shared and agreed values?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree do they offer legal certainty regarding rights, responsibilities and accountability?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree are rules effective and enforceable?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree is the decision-making power at the most appropriate level?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

To what degree are the rules transparent?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How is the environmental law integrated into the legal system?

How well is the environmental law integrated into the legal system?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

What are the narrative, i.e. descriptive objectives included in the water legislation?
Especially with regards to access to drinking water and basic sanitation

What are the numeric, i.e. qualitative objectives included in the water legislation?
Especially with regards to access to drinking water and basic sanitation

How are conversations planned?
Are they planned forms of engagements or impromptu?

How would you rate the overall regulations and agreements aspect of water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on regulations and agreements in Dutch water policy?
Especially in relation to access to drinking water and basic sanitation?

7 Financial agreements

Which principle(s) does the water finance follow?
Solidarity, profit, or polluter pays, or a mixture – if so, how is it decided which part is financed in which way?

Environmental pollution control – is it applicable in the Netherlands? If so, how is it financed?

Are there environmental taxes, if so, any of them aimed at water pollution?

How would the country's current political and financial system react to a political/ financial crisis?

How are water related projects aimed at sustainable access to drinking water and basic sanitation financed?
Top-down or bottom up, or something different?

How would you rate the overall financial arrangements aspect of water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on financial arrangements in Dutch water policy?
specially in relation to access to drinking water and basic sanitation?

8 Engineering and monitoring

How is the design and implementation of water infrastructure carried out?
From global design to detailed design? How does it connect to any agreed Service Level Agreements (SLAs)?

How well does the water infrastructure construction meet the demand for water?
Especially in the case of access to drinking water and basic sanitation?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How is the environmental monitoring system set up? I.e. regarding both administrative set-up (number of tiers, branches, etc.) and the legal regulations that ensure that monitoring systems include reliable data?

How well do you think the environmental monitoring system is set up?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the infrastructure help to maintain or enhance the quality of water resources for ecosystems and humans?0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does water infrastructure ensure aquifers are not over-taxed to points of instability?0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well does the system coordinate resource uses and impacts within appropriate physical units, to account for interconnections between surface- and ground-water?0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

How well are the innovative approaches integrated into the already existing system?0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Where is the balance in the engineering and monitoring between enforceable standards and flexibility in local implementation?

**How would you rate the overall engineering and monitoring aspect of water governance in the Netherlands? ***_0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on engineering and monitoring in Dutch water policy?
specially in relation to access to drinking water and basic sanitation?

9 Enforcement

In order to close the policy cycle from participation, formulating goals, rules and standards and how to make decisions, enforcement is essential to ensure actual achievement of goals. Lack of enforcement will make the water management less efficient. Rules made based on shared values and principles would be easier to enforce as parties would have a strong conviction that they should behave in conformity with the rules. There is a difference between public and private enforcement, in both cases, it is important to know what are the available remedies to achieve the objectives.

How clear would you rate the process of enforcement?
0: not clear at all 10: completely clear

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Is the available enforcement public or private enforcement?

What are the available remedies?

How is enforcement available?

- ○ Via administrative channels
- ○ Via judicial channels
- ○ Via private means
- ○ Other:

Is feedback and monitoring available, together with results in enforcement?
If so, in what form, and what frequency?

How is enforcement regulated?

- ○ It is standardized
- ○ It is flexible, to account for local differences
- ○ Other:

What are the formal and informal responses to policy changes in the current system?

How would you rate the overall enforcement aspect of water governance in the Netherlands?
*_0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

Please shortly justify your above rating.

Any additional comments on enforcement in Dutch water policy? *_ Especially in relation to access to drinking water and basic sanitation?

10 Conflict prevention and resolution

How accepted are the below methods for conflict prevention and resolution in the Netherlands?
0: not at all 10: completely

	0	1	2	3	4	5	6	7	8	9	10
Mediation	○	○	○	○	○	○	○	○	○	○	○
Arbitration	○	○	○	○	○	○	○	○	○	○	○
Court proceedings	○	○	○	○	○	○	○	○	○	○	○
Previously formulated mutually agreed conflict resolution processes	○	○	○	○	○	○	○	○	○	○	○
Traditional processes	○	○	○	○	○	○	○	○	○	○	○

Please elaborate on your above ratings.

Are conflicts treated at the source?

Please elaborate on the above.

How would you rate the stability and reliability of the justice system to handle conflicts?
0: not at all 10: completely

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

How are interdisciplinary solutions used in the case of water conflicts?

How would you rate the overall conflict prevention and resolution aspect of water governance in the Netherlands?
0: not satisfactory at all 10: completely satisfactory

0	1	2	3	4	5	6	7	8	9	10

Please shortly justify your above rating.

Any additional comments on conflict prevention and resolution in Dutch water policy?
Especially in relation to access to drinking water and basic sanitation?

* * *

Would you be willing to answer a few short questions on your responses above?
If so, please let me know your email address where I can reach you most easily. Thank you for filling out this questionnaire.

Links to online questionnaires by topic:
Water systems knowledge
Values, principles, policy discourses
Stakeholders involvement
Trade-offs between social objectives
Responsibility, authority, means
Regulations and agreements
Financial agreements
Engineering and monitoring
Enforcement
Conflict prevention and resolution