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Upstream, Downstream - Conveying Water and Ideas: Potentials for IWRM in Wadi Zabid, Yemen

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Declaration

I, Carmen C. T. From Dalseng, declare that this thesis is a result of my own research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature ……

Date……

Under a ceiling of cobalt

And mirrored by as void a blue,

Wet only with the wind-blown salt,

The Arabian land implores a dew.

…

Hot wind from this Arabian land

Chases the clouds, withholds the rain.

No footstep prints the restless sand

Wherein who sows, he sows in vain.

from Aldous Huxley's *Arabia Infelix*, 1929

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Abstract

Water Resources Management (IWRM) is a popular concept within water management today and has been widely promoted across the world. As a concept with various definitions, questions have been raised both about its actual meaning and also about its usefulness. Because of the concept's vagueness it can be interpreted differently by different actors and might change as it is conveyed from its conception as an idea to reality on the ground.

This thesis investigates what the potential for IWRM is in *Wadi Zabid*, an area in western Yemen suffering from water resource troubles. To find the answers to this, a case study of IWRM and a case study of water management in Yemen have been conducted and analysed together, based on semi-structured interviews from a farming community in *Wadi Zabid*, and document analysis of legal and policy texts as well as the texts of organisations and secondary literature on IWRM and on water management in Yemen. The thesis analyses the concept IWRM and sees how the approach to IWRM changes as it is conveyed from idea to reality on the ground in *Wadi Zabid*, as well as how the structure of the concept itself affects its potential for implementation.

By investigating how IWRM is approached at four different stages of its journey from idea to reality, this thesis maps what affects the ultimate potential of IWRM in *Wadi Zabid*, and also shows how the concept changes. The key finding of the thesis is that the structure of IWRM can be said to affect its potential substantially. The structure of the concept builds on a normative value which I call "a new water ethic". This new water ethic is presumed to exist at all stages for IWRM to work, but I find that this is not the case in *Wadi Zabid*, or in the other stages which also affect the ultimate outcome. The most important implication of this finding is that IWRM`s potential in a specific case has to be studied through the conveyance of the concept at all stages, paying close attention to the concept's structure, if one wishes to truly understand what might work, what might not, and why.

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Note on transliteration

There is no one agreed upon way of transliteration from Arabic to Latin letters (Butenschøn 2008). For the sake of simplicity, any Arabic words or names have been simplified as much as possible in the text, but have been included with proper transliteration in the list below. I have not differentiated between short and long vowels, nor between emphatic and non-emphatic consonants, and both the letters *hamza* and *ayn* have been denoted by an apostrophe (’). Exceptions to this include Arabic words or names which have a commonly used English version e.g. *Sanaa*. I have also used the English plural “s” as opposed to writing the Arabic plural form where applicable, e.g. “shaykhs” instead of “shoyookh”. The proper names of the canals in Wadi Zabid were not available in any other form than simplified transliteration, and are not included in the list.

There are many ways to pronounce Arabic words; my transliteration is based upon the words in their standard form as given by Hans Wehr (Wehr 1966).[1] The system I have chosen for the complete transliteration is the standard of International Journal of Middle East Studies (IJMES) which is frequently used in academic publishing related to the Arab world: http://ijmes.chass.ncsu.edu/docs/TransChart.pdf

Simplified transliteration in text	**ALA-LC transcription**
Al ‘ala fa al ‘ala	Al-ʿalā fa al-ʿalā
Ali Abdullah Saleh (Saleh)	ʿali ʿabdulla Ṣāleḥ
Allah	ʾallāh
Amran,	ʿamrān
Al-Gabarti	Al-gabartī
Al-Mujaylis	Al-mujaylis
Dahr	Dahr
Emir	ʾAmīr
Hadramawt	Ḥaḍramaut
Hadith	Ḥadīth
Haram	Ḥarām
Higera	Hijīra
Hudayda	Ḥudayda
imam	ʾImām
Ma’rib	Maʾrib
Qur’an	Al-qurʾān

Simplified translit. cont.	**ALA-LC cont.**
Rima’a	Rimāʿa
Sa’da	Ṣaʿda
Sanaa	Ṣanʿāʾ
Sheikh	Shaykh
Ta’iz	Taʿz
Tihama	Tihāma
’urf	ʿurf
Wadi	Wādī
Wadi Al-Jawf	Wādī al-jauf
Wadi Ain	Wādī ʿayn
Wadi Zabid	Wādī zabīd

[1] Exception being al-gabarti ruling where the ج is transcribed as g as it is pronounced.

List of Abbreviations

GARWS	General Authority for Rural Water Supply Projects
GoY	Government of Yemen
IFRPI	International Food Policy Research Institute
IC	Irrigation Council
LC	Local Council
IWRM	International Water Resources Management
MAI	Ministry of Agriculture and Irrigation
MAWR	Ministry of Agriculture and Water Resources
MOA	Ministry of Agriculture
MWE	Ministry of Water and Environment
NWRA	National Water Resources Authority
RoY	Republic of Yemen
TDA	Tihama Development Authority
UN	United Nations
UNEP	United Nations Environment Programme
WEC	Water and Environment Centre
WUA	Water Users Association

1 Introduction

Problems related to water supply have become the centre of much attention lately. There are fears that water resources will hinder us in growing sufficient food in the future (Postel 1997: 48). Due to climate change, scarcity of water will be increasingly felt (Gosling & Arnell 2013). There is a limited amount of available and usable freshwater which has to be shared amongst people, and water also has to be shared between people and the environment (Savenije & Van der Zaag 2008: 290).

Yemen, the country upon which this thesis will focus, is currently experiencing severe problems with water shortage. The country is quickly depleting its groundwater resources and faces an acute scarcity of water (WFP 2012; Haidera et al. 2011; Almaz & Scholz 2012). The available water per person per year is 150 m^3 compared to 1250m^3 in the rest of the Middle East and North Africa (Almas & Scholz 2012). Farming consumes 93 per cent of the water used in Yemen (Richards 2002), and is therefore a huge contributor to the country's overdraft of water resources.

In answer to the problems of water resources such as lack of water, pollution of water, environmental concerns and the understanding of water resources as ultimately all connected, there has emerged a wish for management of water resources that deals with this (Savenije & Van der Zaag 2008: 290). One of the most notable suggestions for managing water these past decades is Integrated Water Resources Management, or IWRM, which has become the main framework or approach for development and management of water resources (Gallego-Ayala 2013: 628). IWRM is now a name that comes up very often in the context of global water management, claimed for example by the United Nations Environment Programme (UNEP) to be a major approach within water management (UNEP 2010). The definitions of IWRM are many and varied, but the concept refers, very generally, to the idea that when dealing with water one should take into account all users and uses and try to get the most out of one's water resources, for social and economic purposes, without harming people or the environment. As Moriarty et al. put it, IWRM is: "essentially a loose and fairly general set of principles aimed at more holistic and sustainable development and management of water resources" (Moriarty et al. 2010: 122). Pahl-Wostl et al. on the other hand explain that "the

driving force for the development of integrated water resources management (IWRM) comes from an awareness of the distinctive nature of the resource and its ubiquitous influence on human well-being and environmental sustainability" (2011: 296).

While IWRM has been seen by some as a promising solution for countries experiencing water shortages, others are sceptical of the actual effect it might have and whether it is possible to implement at all (Grigg 2008). The fact that it is seen by many as a "blue print" and, as Moriarty et al. explains, has been converted into a "standard package of water reforms" that has been developed and is promoted by the World Bank and others (Moriarty et al. 2010: 122), is by many seen as a weakness.

This thesis looks at the potential for Integrated Water Resources Management (IWRM) in Yemen, and particularly focuses on *Wadi Zabid*, an area in the western part of the country. *Wadi Zabid* is a case in point when it comes to water management, as farmers in the valley struggle over available water resources and also contribute to water shortage in the villages downstream on the coastal plain downstream of the valley. In order to understand the potentials of IWRM in *Wadi Zabid*, I argue that one must first fully understand what IWRM is. What is more, IWRM is not a "thing" you can export to *Wadi Zabid* as you might a machine or a specific operating procedure. It is a concept that is interpreted, presented and dealt with by different actors as it is conveyed from one stage to another, from its conception as an idea, to reality on the ground. In social sciences, studying the relation between social units can be as important as studying the units themselves (Grønmo 2011: 109). As the actors of each stage deal with the concept, their approaches might differ which can affect the approach at the other stages. Therefore, it is not only the approach to the concept by the people of *Wadi Zabid* which is necessary to investigate.

The aim here is therefore both to point out how well suited IWRM is to improve the water situation in *Wadi Zabid*, but also to explaining how this potential is affected by contextual factors in Yemen as well as the concept's change on the way from global idea to local reality. Different people might interpret things differently and be faced with different obstacles, which in turn will effect what you aim to do in practice, and also how you are able to do it. By studying the conveyance of the concept, it is possible to understand *where* the problem lies when the potentials of IWRM are limited.

1.1 Approach and Research Question

Because IWRM is such a complex concept, finding out what it is, is a natural starting point for investigating its potential in *Wadi Zabid* or anywhere else. However, it is not only a question of finding out what IWRM is and then see what circumstantial factors in *Wadi Zabid* affect its potential; it could be that a closer examination of the concept itself, explains the potentials as well. So in other words, we have to look at both the concept itself and the place where we wonder about its potential.

As I wish to say something about IWRM in the Yemeni context in *Wadi Zabid*, I will be dealing with the concept as it is approached by the people "on the ground" there. However, what happens, or does not happen, in *Wadi Zabid* is related to the Yemeni Government and their approach to IWRM. They in turn get their information about IWRM from the Global Water Partnership (GWP) who has their own interpretation of IWRM based on the Dublin Statement. Hence, I choose these four stages: I: the idea of IWRM, II: the way it is operationalized, III: the way it is implemented and IV: making it work as an approach to the topic.

The concept IWRM was created and exists in a global sphere of scholars, politicians and policy makers and donors, while I am investigating its potential at a relatively small, local area in Yemen. How does the concept make its way from the former to the latter, and what happens to it as it makes this journey? At each stage of relaying the concept it is approached differently and can potentially be interpreted differently and gain a different meaning; or simply be subject to different real life restrictions. Whether a scientist at an international conference, a consultant at an NGO, a civil servant in the Yemeni Government, or a farmer in *Wadi Zabid*, chances are you will have different understandings and interpretations, and in any case you will be subject to very different realities which determine what you can and cannot do. Therefore, the actual potentials for IWRM in *Wadi Zabid*, could depend highly of these other stages the concept journeys through.

As mentioned, I have chosen four different stages where I look at how actors approach the concept IWRM. At an international level, the concept is expressed as an idea by experts on a global scale, but it is also operationalized into more specific recommendations. In Yemen, on a national level the concepts and its suggested operationalization are approached by the

government, and at a local level the concept is approached by the local community. I have deliberately chosen the vague term "approach" because at each of the four stages the concept is being dealt with in different ways. The top two stages primarily present the concept, while the two bottom stages to a larger extent are receivers of the concept. Therefore, when I look at the approach of the top two stages it will be first, in terms of how the first stage *defines* the concept, then in terms of how the second stage *re-defines* it. While when I look at the bottom two stages I will describe the approach to IWRM by looking at what is *being done*, how one acts, attempts to act, or does not act in relation of the concept.

In this thesis the four stages I will investigate are represented by the Dublin Statement, Global Water Partnership (GWP), the Government of Yemen and people of *Wadi Zabid*, depicted in Table 1 below. The design of my research is to explain, as the first stage, what the concept IWRM is for which I will rely on the Dublin Principles. With this as a starting definition of the concept, I can investigate how the interpretation and approach to its definition changes as it moves from idea to reality. When I then look at the GWP at the second stage and how it approaches IWRM I can note the differences between the idea, as presented by the Dublin Principles, and GWP's operationalization of this idea. The Government of Yemen represents the third stage in my thesis. At this stage plans, policies, and legislation are put—or attempted put—in action. At the last stage I look at *Wadi Zabid* to see how IWRM may work on the ground. This stage helps us understand how IWRM may be approached by the group that is the most important one—the ones using the water. Thus, it is not a question simply of whether IWRM is a problematic concept, or whether the contextual factors in *Wadi Zabid* make IWRM unsuited there. Rather, there is within each stage a different approach to the concept and this will affect the outcome. My Research question is:

What is the potential for IWRM in Wadi Zabid, and how is this potential affected by the conveyance and structure of IWRM?

Regarding the potential of IWRM, I look for the possibilities as well as obstacles and limitations in *Wadi Zabid* in reference not only to what changes IWRM potentially can achieve, but also to whether it is possible to implement in the first place. The "conveyance" of the concept refers to how the concept changes through the various actors who are part of

conveying it to *Wadi Zabid*, and the "structure" refers to IWRM itself – how it is defined at the outset.

The sub-questions guiding my research to answer the research question are:

1. What is the concept IWRM?

2. What are the interpretations of the people IWRM is conveyed between, and what realities or constraints are these people faced with?

3. How does all this affect the potential of IWRM in *Wadi Zabid*?

The relevance of this study is twofold. Not only will it inform us about the contextual reality of *Wadi Zabid* a place there in general is limited research on; it will also give insight into that when a problem occurs in terms of the potential of IWRM, it might be the local context which causes it, it might be the concept itself, or it might be the concept's journey through different stages.

I have chosen four different stages in this thesis. While two of them are a given if one wishes to study *Wadi Zabid* and also accepts my argument that the Dublin Principles are the foundation of IWRM, the other two are not the only stages that could have been chosen. GWP is not the only institution interpreting and operationalizing IWRM, and one could easily imagine one or several stages of interpretation and presentation between the Government of Yemen and *Wadi Zabid*. However, the GWP is chosen because it is by far the most prominent presenter of IWRM and aims specifically at conveying IWRM to practitioners through its GWP IWRM ToolBox website. To investigate IWRM, obviously one has to know what it is, but it so happens that determining what IWRM is no easy task. I could for example have used the much quoted definition of the Global Water Partnership (GWP). I have however chosen to use the Dublin Principles as a definition. This has two advantages in my opinion. First of all it carves out some common ground as many scholars view the Dublin Principles at least to some extent as defining IWRM. Furthermore, it creates a concrete definition to start from. While the Dublin Principles can also be used to promote different agendas (as presented by Conca 2006: 155) they can also be said to have *some* concrete if not specific meaning. Because IWRM (as defined by the Dublin Principles) is a complex concept consisting of many things

as I will show later, I will not be looking at the potential of the concept as a whole, but will have to limit my investigation to some elements of the concept.

To study the journey of IWRM from idea to reality I have looked at two other stages between the first (the Dublin Conference) and the last (*Wadi Zabid*). These are the organization Global Water Partnership (GWP) and the Government of Yemen. The reason I have chosen the organisation Global Water Partnership as the second stage because they attempt operationalize IWRM, not just present it, and, to some extent, is an organization which defines IWRM for the Government of Yemen (Hübschen 2010: 110; RoY 2008: 3). At Stage III, I am looking at the Government of Yemen because they are the institution that would be implementing any legal or policy changes related to IWRM. They are the ones who potentially take a definition of the idea and try to set it into action. Much of what the government does is most likely influenced by international donors. However while the World Bank almost certainly played an important part in the writing of the NWSSIP for example, this is still Yemeni national policy. While it would be fascinating to investigate how policy favoured locally differs from that effectively imposed from international donors, this is beyond the scope of this thesis.

Table 1: The Different Stages of IWRM

Different stages of IWRM			
Idea to realization ↓	**Name of stage**	**Represented by:**	**Approach**
	Stage I	The Dublin Conference	Defines the concept IWRM
	Stage II	Global Water Partnership (GWP)	Tries to operationalize the concept but also re-defines it
	Stage III	Government of Yemen	Implements, attempts to or does not implement IWRM do not, or attempt to implement the elements
	Stage IV	Respondents in *Wadi Zabid*	Act or attempt to act or do not act upon the elements

1.2 Structure of the Thesis

The next chapter will present the data and methods used to answer the research question and discuss the strengths and limitations with these. The rest of the thesis is divided into two parts: Part One focuses on the international level, and Part Two focuses on the national and local level in Yemen. In Part One, Chapter 3 investigates Integrated Water Resources Management (IWRM) as an idea. This chapter tries to answer the question of what IWRM is. By reviewing the discussions and criticisms of IWRM I explain where the concept comes from and argue for the use of the Dublin Principles as a definition of the concept. By studying the Dublin Principles I identify the elements which the concept is made up of. I end this chapter by choosing three elements of the concept which I limit my investigation of IWRM to in the remainder of the thesis. Chapter 4 looks more closely at the three chosen elements and presents some theoretical perspectives on each of them. Chapter 5 presents the Global Water Partnership's (GWP) operationalization of IWRM as presented in their web based "ToolBox", and discusses the difference between the Dublin Principles and the GWP's approach to the concept in relation to the theoretical perspectives presented in the previous chapter. Part Two begins with Chapter 6 which offers some background information on Yemen. Chapter 7 analyses the Yemeni Government's approach to IWRM by looking at the country's water law and the National Water Sector Strategy and Investment Plan (NWSSIP), as well as presenting the contextual constraints facing the government. I end by discussing this in relation to the Dublin Principles and the GWP's operationalization of IWRM. Chapter 8 presents the current situation in *Wadi Zabid* and investigates the potential for IWRM there by analysing interviews with respondents in the area. Finally, I discuss how this potential is affected by the other stages, as well as by the structure of the concept itself. Chapter 9 sums up my findings and concludes.

2 Data and Methods

In this chapter I will explain how I have chosen to go about answering my research questions—in terms of type of data and method for data collection and analysis—and what the advantages and possible problems of these choices are.

2.1 Cases and Sampling

The original plan for this thesis was to focus on Yemen and see how we could expect implementation of Integrated Water Resources Management (IWRM) to work there. Initially, the idea was to carry out interviews with the farmers and other local figures in *Wadi Zabid*. These interviews would build on, and elaborate, the information gathered in *Wadi Zabid* by the Water and Environment Centre (WEC) at Sana'a University in the fall of 2012, as a part of a research project carried out by MetaMeta Research in collaboration with WEC, and funded by the Dutch Government. Unfortunately, the security situation during my time in Yemen prevented me from carrying out the originally planned field-work. I was however, able to spend one month in Sana'a with the group at WEC, who very kindly introduced me to the data they had collected, which MetaMeta generously has allowed me to use in this thesis.

In order to investigate how IWRM might work or not work in the Yemeni context, the concept IWRM had to be defined. This turned out to be a greater task than I had anticipated. The plethora of various interpretations, as well as the academic discussion around IWRM, made it hard to understand what this concept actually entails. It was therefore necessary to go deeper into the concept itself, which has become a large part of this thesis. I decided to use the data collected by WEC, but instead of only focusing on the case of *Wadi Zabid*, to look more closely at IWRM itself as well. In the process of defining IWRM, I had discovered that much of the scepticism around IWRM was due to the confusing, hierarchical structure of the concept. While the concept "makes sense" when viewed as several tools, goals and beliefs all put together in this hierarchical structure, the question was whether those concerned realised or agreed with the structure itself, and also the different elements it is comprised of. "The concerned" in this case would obviously be the people in *Wadi Zabid* as well as those who were behind the concept in the first place. In addition to these two, were the ones who "handled" the concept between its conception as an idea on how to deal with water, to its

reception on the ground. I decided upon the four different stages mentioned earlier, and have used four different sets of data to represent each stage.

Therefore, in order to answer my research question this thesis is a qualitative study of two cases, IWRM and *Wadi Zabid*. A case study "entails the detailed and intense analysis of single case" (Bryman 2004: 48). Case studies can have different purposes. The case can in itself be the object one seeks to understand in a comprehensive way or it can be to develop concepts, hypotheses or theories. The latter here sees the case as one example of larger universe one generalises to (Grønmo 2011: 90). IWRM and *Wadi Zabid*, seen by themselves, present the former; I seek a comprehensive understanding of IWRM, what it entails and how it changes from idea to reality. I also seek a comprehensive understanding of water management problems in *Wadi Zabid* and the role IWRM can play in dealing with this. As this is not the evaluation of a concrete attempt to implement IWRM in *Wadi Zabid,* I do not operate with a specific definition of what it means that IWRM "works" or does not. Instead, I try to map the various possibilities, obstacles and limitations that exist. One could therefore say that IWRM represents what Robert Stake would call and "intrinsic case study", that is, a case that is chosen not because it represents other cases, but because it is interesting in itself, while *Wadi Zabid* represents an "instrumental case study" which is chosen to help understand something else (Stake 1995). In this thesis *Wadi Zabid* helps us understand how IWRM can work or not in a specific case, and how its structure and the conveyance of the concept play a role.

Previous research on IWRM can be largely divided into two groups in terms of approach. The first group is a more theoretical one, the second more practical one. Either it is the concept of IWRM itself that is being studied, questioned or explained; or a given definition of IWRM is used to assess its implementability or achievements in a specific context. Instead of choosing one of these two approaches, this thesis combines the two in order to fully understand the potential for IWRM in *Wadi Zabid*. One can say that this thesis contains two case studies which are so interlinked that one cannot be studied without the other. If one wishes to study the potential of possible solutions to *Wadi Zabid*'s difficult water situation, IWRM is a good choice as a case study of one such solution because it is widely used and referred to in international water management and development contexts. However, *Wadi Zabid* also

functions as a case study to investigate IWRM. If one wishes to study the potential "on the ground" for IWRM a case study from a specific area is needed. Yemen in general is a well suited choice and *Wadi Zabid* is in particular an interesting case study because of the water situation there. However, looking at the contextual factors in *Wadi Zabid* affecting the potential of IWRM alone will not explain fully why something works or does not work, one needs also to look at IWRM itself.

Yemen and IWRM are in many ways a "perfect pair" in that they are both highly relevant and topical examples of a proposed solution to water problems place in need of a solution to water problems. Being one of the most talked about concept within water management[2] and with its focus on spreading it around the world, IWRM is an important concept to study. Yemen, being one of the world's most water stressed countries and being much poorer than its oil-rich neighbours who are able to deal with their similar scarcity, is both acutely important to study and offers an example of what is possible or not in a rather extreme situation.

The reason for *Wadi Zabid*'s selection was the research group's encounter of the village *Al-Mujaylis* on the *Tihama* coastal plain which had lost its groundwater and as a consequence was seeing desertification and large numbers of the villagers' emigration. It was discovered that most likely the lack of groundwater was a result of water use in the two upstream areas: *Wadi Rima'* and *Wadi Zabid*. Consequently interviews were held with groups from the three places about their understanding and experiences of the situation of the water resources. Of the three areas interviewed by WEC, I chose to use the data from *Wadi Zabid*, as this was the data I had worked with whilst writing a report (Al-Qubatee et al., forthcoming) I did together with WEC and MetaMeta Research, and knew the best.

[2] Regarding the term "water management"; when talking about our dealings with water both the concepts 'management' and 'governance' come into play. 'Water management' and 'water governance', while both potentially difficult to define, are not the same thing, but are sometimes used interchangingly. According to Hall, "*Management* refers to the implementation of actions aimed at achieving a society's vision ..." while "*governance* relates to the broader social systems of governing, systems that enable society to accept or reject alternative political agendas or societal visions" (Hall 2010: 30, italics in original). In other words, governance is the system of how authority is exercised, while management is the physical attempt to realize a vision. Later, when I look at the concept Integrated Water Resources Management (IWRM) I will explain how – despite its name – it is not just 'water management' but instead a broader concept for dealing with water and indeed a vision. I will explain how it is based on a certain understanding of water, and contains elements of water management as well as elements of water governance. In this thesis, unless anything else is specified, "water management" is used as a general term to cover dealing with water, whether in making decisions or distributing it for example. But here, first, I am explaining a historical change in the *understanding* of water.

2.2 Type of data

In this thesis I draw on a variety of data sources. IWRM is investigated at a number of stages, each requiring different types of data. Stage I in many ways lays the foundation for the subsequent chapters. It is here I define IWRM and the elements which make up the concept, and it is from these I choose the three elements which are investigated in the rest of the thesis. At Stage I my primary data is the Dublin Statement, which is comprised of four principles and an action plan. This was chosen as the first stage because, as explained in Chapter 3.3 the Dublin Statement can be seen as defining IWRM concept, and thus it offers a natural starting point.

Data for Stage II is collected from the GWP's website; it consists of their presentation and explanation of what IWRM is, and their virtual "ToolBox" of IWRM tools which they present there. The IWRM ToolBox consists of 59 tools which are "individual policies and guidelines on IWRM" (GWP ToolBox 2012), as well as case studies on the individual tools, reference material, an overview of challenges to human development, and a collection of various countries IWRM plans, policies and water laws (GWP ToolBox 2012). I have chosen to look at the 59 tools as well as the GWP's background material explaining the challenge and also IWRM. In total I will examine approximately 170 pages of text which allows us to see how the GWP approaches this concept, and if and how this approach differs from that at stage I.

The data for Stage III is both based on official documents as well as secondary literature about the water sector in Yemen in the form of scholarly articles, as well as some reports. I have limited the collection of information to the period after 1970s, as this was when Yemen experienced big changes regarding its water resources. I have looked primarily at the Yemeni Water Law of 2002 and its 2006 amendments, and the NWSSIP of 2004. The focus is not limited to the Government of Yemen's interpretation of IWRM, because their approach to the concept is also affected by various contextual realities. The secondary literature consists of scholarly articles on water management in Yemen covering aspects such as agricultural change, traditions, and economy; and reports and surveys from the World Bank and UN Institutions. This allowed me to see the law and policy documents in context, and also form some conjectures about what was possible for the Government of Yemen to carry out in terms of water management. While it would have been interesting to interview government officials in the water sector for Stage III, this was made too difficult to carry out by my early return

from Yemen. With very little information available online, and the practical difficulties of phone interviews I decided this was not feasible. Government officials would have been able to provide me with information both on their interpretation of IWRM, as well as the reality they were faced with. The data used for Stage III in this thesis however, offers the second best thing.

The data for stage IV consists of semi-structured qualitative interviews from *Wadi Zabid* in the Governorate of *Hudayda* in Yemen, where one sampled farmers mainly as well as key informants with other functions in the community. In *Wadi Zabid* several large irrigation projects have been carried out, where the Yemeni Government together with the World Bank have built weirs across the riverbed to increase the efficiency of irrigation. There are currently four such weirs at different intervals along the mountain side and the farmers receive water at different times of the year according to an old legal system. I was told that the research group had attempted to represent the farmers from the different weirs more or less equally, but in the end almost all the interviewees were from the top two weirs and only one from the last weir. While this is unfortunate because the last weir is the most challenged as it receives water after the other three and one might have expected different views from this group, on the other hand, the groups further upstream are the ones who will have to agree to change if the situation is to be altered so in a way they are really the most interesting. All in all I draw on 20 individual semi-structured interviews were carried out in addition to one group discussion and one impromptu informal conversation. Of the 20 interviews, three are key informants who were asked additional questions. The farmers were asked about their perception of the current water situation in terms of resources, use and management, what they saw as challenges and what they thought possible solutions were. The interviewees do not constitute a representative selection of *Wadi Zabid*.

Furthermore, it is important to add that I am not limiting my gaze to specific measures "labelled" IWRM by the Yemeni Government and attempted implemented in *Wadi Zabid*. Instead I want to look at the potential for the elements in a much broader sense, whether they appear for example as a concrete suggestion from the GWP and are implemented by the Yemeni Government in *Wadi Zabid*; or whether they appear as a wish or reality among the population in *Wadi Zabid*. As there is to my knowledge no one single, official, Yemeni

Government plan for IWRM implementation, with specific targets to this thesis cannot determine the success or failure on part of the Yemeni Government in using IWRM as a solution for water related problems. That said, nor has the focus of this thesis been the Yemeni Government's success or failure in implementing their understanding of IWRM in *Wadi Zabid*, rather how their understanding might contribute, along with the understandings at the other three stages, to success or failure of implementing IWRM in *Wadi Zabid*.

2.3 Data Collection

Data collection for stages I, II, has been unproblematic as the Dublin Statement is available online from the United Nations agency the World Meteorological Organization, and documents for stage II could be downloaded from the Global Water Partnership's website. The official documents for Stage III, although available in English, offered some challenges as official Yemeni websites are often poorly organised, seldom updated, or inexistent. These and other secondary literature from Yemen through the search engine Google, and also the pages www.yemenwater.org and www.tc-wateryemen.org that provide a collection of publications on water in Yemen. The data for Stage IV was more challenging. It has been a disadvantage to be removed so far from the interviews as well as the interviewers. Using somebody else's data meant forfeiting the opportunity to experience the context of the interviews, ask follow-up questions and clarifying when necessary. It was a great advantage to be in Sanaa at WEC because I could work closely with one of the interviewers in translating the questionnaire answers from Arabic to English, and ask questions to any interview notes I found confusing. However, this was extremely time consuming and could only be done for some of the interviews, the rest were translated by an agency. It was only when I had returned to Norway and begun analysing the data, I realised how much more informative the interviews that were translated with the interviewer were.

One thing affecting data collection was language. Among the various difficulties of language was that of translation – of the questionnaires. Because the questionnaires were answered orally and the answers hand-written by the interviewers it was impossible for me to translate them myself. Some of the questionnaires I translated together with Wahib Al-Qubatee who was one of the interviewers. This had the obvious advantage of providing me with additional

information and explanations of some of the answers, for example those which referred to what was common knowledge for the researchers and interviewees but unknown to me, or instances where the answer was a simplified shorthand like version written by the interviewer and understood by him only (so for example they would jot down a few words which would remind them what the whole response had been). However, this work became extremely time-consuming much due to language barriers and limitations in my knowledge of Arabic. It became necessary to hire a translation agency to translate the responses. There were two drawbacks of this; first of all it was costly (the project kindly funded the translation, but the funds did not cover the translations of the questionnaires from all of the project (*Wadi Zabid, Wadi Rima'*), instead I could only translate the questionnaires from *Wadi Zabid* and a few of those from *Wadi Rima'*. Another hard learned lesson from this process was that my instructions to the translation company were not clear enough, resulting in some dubious translations which required me to go back to the hand written responses to make sure I had understood the respondent correctly – a time consuming and difficult process. As far as the translation with the agency goes, I should have worked closer with them from the start, first of all making it clear what I needed as well as using my time in Yemen to work with the data (translations of the interviews) as they arrived as it would have been far easier to figure out difficulties either by consulting the agency or the group at WEC, before the lapse of time and space made this harder. In retrospect, a better knowledge of Arabic would have been a huge advantage. However, the Arabic I do speak was of great help, and so was being in Yemen which made it efficient time-wise and money-wise to get hold of translations.

2.4 Ethical considerations

A researcher must always be conscious of possible ethical challenges of research. Kvale (2005) lists three main issues that must be taken into consideration: informed consent, confidentiality, and consequences. Informed consent means that those interviewed are aware of the purpose of the interview and any potential advantages or disadvantages of participating, and can at any time cease to participate. Confidentiality means not revealing the respondents' identities. In this thesis, respondents are made anonymous and while their relative geographical positioning to each other gives some indication of which group they belong to, it cannot be traced back to individual persons. Persons holding an official post and answering

within that capacity are not anonymised although they are not mentioned by name either. Considering the consequences research might have for participants is also vital, so that the participants do not suffer from partaking and that they ideally benefit in some way from the research (Kvale 2005: 69). While this specific thesis might not directly give anything back to the interviewees, it spreads the knowledge about their situation and also generates knowledge which might be helpful in a future development or planning scenario. Furthermore it is part of a larger project which both generates new knowledge about the situation in the area, and also shares information between the participants who are closely linked by their common water resource, but spatially separated by long distances.

2.5 Analysis

When analysing the data I worked my way through the different stages beginning with Stage I. For stages II, III, and IV, I first chose the elements and then coded the data in accordance with these. In other words, having chosen which elements I was studying, I then gained an understanding of each element by reviewing some theoretical perspectives on each. I could then enter the data material, separately for each stage, coding the information I found relevant in relation to the elements or as background information. Some information pertained only to one element, other information to two or all three. After having divided the information thus, I went through the data again, interpreting it in light of my research question.

Stage I was somewhat different as this was where the elements were defined. I have approached the analysis of stage I in a way similar to what Grønmo calls "qualitative content analysis", systematically studying the contents of a text, in order to map the views and values presented (Grønmo 2011: 128). By looking at the four Dublin Principles and their accompanying explanatory text I have broken down each of the principles into the various elements they are comprised of, grouped similar elements together and also arranged them hierarchically according to each other in a matrix. Having thus established a starting point for what IWRM is, I could begin studying the various approaches to the concept at the different stages. For the sake of brevity, I had to make a selection of the many elements identified. I decided upon three that I saw as central to the concept and that also represented different types of elements. The three I chose were "water as an economic good", "participation", and

"a new water ethic". The two first are interesting because of their prominence in the Dublin Principles. Two of the principles (2 and 3) deal with participation, either in general or specifically in the case of women. "Water as an economic good" which I have argued is a tool because it is presented as a way of achieving something, is also given one entire principle. "A new water ethic" is particularly interesting because it is the foundation for the entire concept. As such, it is also different from the other elements of the concept, but is arguably the most interesting as it feeds into the rest of the elements. Thus, while as a concept it encompasses IWRM and not the other way around, it is nevertheless a very important part of IWRM. Without this new water ethic, there is theoretically no need for, the other elements; they are dictated by the new water ethic. Therefore, while IWRM has emerged from a new water ethic, the same ethic is also a vital part of IWRM. While I consider these three elements to constitute a very important part of IWRM, choosing only these three naturally means that there are many parts of this concept I am not investigating. There are many other elements that deserve further investigation, but these three will let me investigate a large part of IWRM as well as draw on a considerable amount of literature. In terms of the Yemeni context, participation and a new water ethic are particularly interesting. Because the central government has limited power, the traditional structures are strong, and the country presents a wide diversity of individual cases; local rather than national solutions are seen as the best way forward for improvement to water management in Yemen (Hübschen 2010: 106). Furthermore, as a country which has dealt with scarcity of water for centuries a water ethic is naturally present (albeit perhaps in a different form than in the Dublin Principles) and important to how water is dealt with elements.

In order to know what to look for when analysing the different stages' approach to these three elements I have relied on some theoretical perspectives on each of them. For the element "recognising water as an economic good" I have mainly relied on Savenije and Van der Zaag's (2002) explanation of two schools of understanding, supplemented with other literature. For the element "participation", I have used Reed's (2008) typologies of participation to compare and contrast the different approaches to this element. I will mainly rely on Kemper et al.'s (2007) framework for studying the potential of improved basin management through decentralization, as an analytical tool when investigating potentials and problems at stage III and IV. The automatic link between "participation" and

"decentralization" is discussed in the chapter dealing with theoretical perspectives on participation. To study the different approaches to "a new water ethic" I have relied on Armstrong's (2006) four different ethical positions. These have allowed me to see how the four stages agree or disagree on their ultimate aim. As "participation" and "water as an economic good" and "a water view" are not "inventions" of IWRM it might well be that these are already in place in *Wadi Zabid*, albeit not under an official IWRM-flag, but as local customs recent or ancient. Whether they are or not, the question is what the potential for these elements are. Therefore if one finds that some aspects are already in place, and these can be said to be the same as what IWRM is defined as, it does not diminish the relevance of the study, rather it allows us first hand evidence or indications of how IWRM might work or might not work.

Analysing the documents for stages II, and III, I have used what could perhaps be seen as something in-between what Grønmo (2011) calls "qualitative content analysis" and "quantitative content analysis". While the former focuses on developing categories while working through document data, the latter operates with a set of specific, set categories used to code the material. While I did enter the data with predefined categories, these categories were very wide and were to some extent shaped by the data as well as they became more clearly defined as I went through the data. Although critically analysing the contents of the documents, I have taken their statements at face value. I have not attempted to get at motives behind the text, but rather trying to determine what the implications of their statements are; what understanding of a specific element they present. I find this the most relevant approach as the GWP ToolBox, the Yemeni Water Law, and the NWSSIP are documents that in themselves determine, at least in theory, how one deals with water.

For Stage II, in order to investigate the GWP's approach to IWRM I systematically went through the entire web-based ToolBox categorizing information according to the relevant elements, and tried to answer how the GWP's interpretation of IWRM (the three chosen elements) differed from that in Stage I. For Stage III, I went through the Water Law and its amendment, and the National Water Sector Strategy and Investment Plan (NWSSIP) in the same way as the GWP documents; categorising any relevant information according to the

three elements. I then presented the realities facing the Yemeni government, discussing this in relation to the theoretical perspectives on the respective elements.

In analysing the interviews from *Wadi Zabid* for Stage IV, I have relied on a "naturalistic approach" which treats the respondents answers as information about reality, and sees their interpretations as representing the truth, or their reality (Ryen 2002: 62, 72). For Stage IV, I first went through all the respondents' answers plotting a condensed version of them into one spreadsheet, categorised only by respondent number and question number. This both helped me familiarise myself with the data, check if the data was complete and also gave me access to the data from a "birds-eye perspective", allowing me to see the variations and similarities in answers, and more easily spot answers and connections which were particularly interesting. This was also a good way to re-introduce myself to the story of the respondents in *Wadi Zabid*. After having established the elements I was investigating, I went through the original interview transcriptions again, coding them according to the elements. I then categorised the answers, or parts of answers, according to common themes or topics. Finally I reviewed these in light of the research question. This last step also meant breaking up and reorganising what I had earlier grouped together in a common theme or topic as it became clearer during the analysis what the most interesting connections were. The analysis for Stage IV was therefore also a combination of entering the data with predefined categories, but also letting the data define the categories to some extent.

2.6 Validity

Determining validity in research is about determining "whether or not the researcher is measuring and finding out what she think [sic.] she is and how that relates to her research question" (Mathews & Ross 2010: 12). This is also called "internal validity", as opposed to "external validity" which deals with the generalizability of the results—to what extent the results apply to a wider population (Bryman 2004: 29).

According to Kvale and Brinkmann (2009), internal validity is essentially making sure that the quality of the research is good so that one is gathering data and analysing it in a way that gives a valid picture of what one is researching. Going through a wide range of documents for Stage II, and using both the Yemeni Water Law and the NWSSIP in addition to background

material on the water sector in Yemen, helped improve the internal validity for this stage. By printing out the entire GWP ToolBox and working only with this copy I ensured that I investigated the ToolBox as a whole at one point in time and that the pages were not subject to updates while I was studying them. The interviews were collected by a group of researchers, which also improves the validity of the data, and while I was faced with the language challenges mentioned above, which can be a problem for the internal validity, the time spent going through the data with the researchers at the Water and Environment Centre (WEC) at Sana'a University helped give me sufficient and clear understanding of the data.

Concerning external validity, Yemen is a diverse country both geographically and politically and findings from one location do not necessarily reflect the reality elsewhere. My study is of one, small area facings its own type of geographical issues and having its own relation to the state in general. And while it won't be possible to say what the limits, obstacles or potentials are in the whole of Yemen, our case will let me show one example of the possibilities or obstacles that exist, and also explain how these are related to the larger context (the country as a whole) even if it does not tell us about what the scenario might be elsewhere in the country. The data collected in the study is not a representative selection from the area studied and cannot do more than show us a few of the possibly very different beliefs, views and attitudes of people in the area. However, wishing to look into the *potential* for IWRM in this area, these few interviews can give us new insight into what might work and what might not work and why, even if they cannot tell us whether IWRM is a possible solution for the area.

"The crucial question is not whether the findings can be generalized to a wider universe but how well the researcher generates theory out of the findings" (Bryman 2004: 52). The potentials for IWRM in *Wadi Zabid* do not necessarily apply in other areas in Yemen or other similar places, but what my findings show about the way IWRM's structure, and how it changes as it is conveyed through different stages, affects this potential, might be relevant way to study IWRM in other contexts also.

2.7 Summing up

Despite its limitations, this thesis hopes to shed some light on the properties of IWRM as well as the potentials for IWRM in *Wadi Zabid*, Yemen; on why IWRM is such a confusing

concept, and map out a definition that lets us investigate the potentials of IWRM in Yemen, how the concept changes as it is conveyed, what the structure of the concept is and how this affects the potential in *Wadi Zabid*. However, the findings will of course be limited to my one chosen definition. The same goes for the testimonies of the respondents in *Wadi Zabid*. Their statements might not reflect what the rest or the general majority of the area think, but they do give us examples of what beliefs, views, and attitudes *can* exist in such an area, and how they affect the potential of IWRM. Hopefully, by saying a little bit about all these things, this thesis will not be limited to showing what can work and what can have trouble working in *Wadi Zabid*, but also be able to offer some explanation as to *why* trouble arises.

Part One—The International Level

3 Stage I –IWRM: The Idea

Stage I deals with the task of explaining what IWRM is. Here, I will show how IWRM grew out of a paradigm change in water management in the west. IWRM might be difficult to define when presented in its widest sense, as an emerging trend or idea, but IWRM has also become a more specific concept; defined by the Dublin Principles. Therefore, the history behind IWRM as an emerging idea from a paradigm change within water management, as well as the Dublin Principles, will let us gain some understanding of what IWRM actually is. This understanding is in no way very specific or definite and has several alternatives, but it will nevertheless offer a necessary starting point for the rest of this thesis.

The chapter is divided into four main sections. In section 3.1 I will present the background for IWRM's birth. By background I mean which ideas are seen to be behind this concept, and where and who these ideas come from; the so-called paradigm change which IWRM can be said to have grown out of. This presentation will help me explain what this elusive concept is, generally speaking, and also help me interpret the Dublin Principles later. In section 3.2 I will present IWRM, its emergence and also some of the criticism it has received for being difficult to define, and hence understand or use. Section 3.3 presents the Dublin Principles as a current form of IWRM, and the elements that make up the concept. In this section I will argue that the Dublin Principles are a relevant and useful starting point for investigating the potential of IWRM. I will explain how in my opinion it is difficult to grasp IWRM as a concept because it consists of several elements which I group into IWRM "beliefs", "goals" and "tools". I will show what in my opinion the different elements of IWRM are, show how they are hierarchically structured, and choose three elements which I investigate throughout the remainder of the thesis. Section 3.4 sums up the findings of the chapter.

3.1 Water – Understanding the Resource

In order to understand much of Integrated Water Resources Management (IWRM), it helps to understand where the concept comes from. Lately there has been much talk of a paradigm change (Pahl-Wostl 2011a: 838). IWRM can be seen as growing out of the new paradigm. Here, what is meant by a "paradigm change" is a new way of dealing with, or even thinking about water, which has come into being as a result of various, historical changes. The

discussion of a changing paradigm I am presenting here will not apply globally, but it does to a large extent apply to the discourse of international academia as well as global organizations which largely are situated in "the North." IWRM itself is also referred to by some as a new paradigm (for example Cook and Bakker 2012: Musingafi: 2013), however as the definition of IWRM is so contested and complex, I wish to deal with the changed paradigm more broadly as a new understanding or view on water.

3.1.1 Humans and Water

Throughout history, water has shaped human life but humans and civilizations have also shaped the water around them. Water is indispensable for human life and determines not only if we live or die, but also what and how much we can produce, most importantly of our food. Naturally any lack of water has to be dealt with in one way or another; if there is no water there can be no society. However one can also see it the other way around—where society is, there is water—as all civilizations have through their histories engineered water in some way or another (Allan 2005: 187). We know of many ancient civilizations, and also modern societies which are famed for their control of water: irrigation along the Nile in ancient Egypt, Queen Sheba's Great Dam of *Ma'rib* in Yemen, the Three Gorges Dam in modern China, and the Dutch dikes, to mention just a few.

In our recent history the interaction between nature and society has in the developed world been in the terms of the conquest of nature, where society laid water under its control to use it for people's benefit. As Ian Calder puts it: "In many developed countries the ethos of the water engineer was to equate efficiency with maximum use of the water resource for the users" (Calder 2005: 80). With technological progress, new solutions to existing problems of irrigation were found (Boelens et al. 2005: 8). It used to be the job of engineers mainly to deal with or acquire the water that was needed (Savenije & Van der Zaag 2008: 292). This determined how one thought about the resource. David Gilmartin (1995: 212) gives an example of this from India under British colonial rule where canals were constructed for irrigation. As engineers became the group in charge of this work, so the goal became to maximize irrigated land by modelling the water, the idea being that it was possible to know and control the system. As urban populations grew in the past two centuries, and industrial and agricultural production grew with it, new water related problems and issues arose which were dealt with through technical solutions (Pahl-Wostl et al. 2011a: 838).

Over time however, the way we relate to this natural resource began to change. Lack of water and the limits of engineering to always solve our problems have become apparent, as "planners and engineers have looked farther afield for new water sources to tap" (Postel 1997: 41) And the end of the 20th century saw criticism of what up to then had been the current mind-set. Christopher Ward (1995: 2) explains that one encountered problems when water management was divided into highly specialized areas for flood control on one hand and irrigation on the other. According to Pahl-Wostl et al. (2011b: 294) one began realising that "… total knowledge of system behaviour and system performance is unattainable" as well as a call for more democracy in resource management (Pahl-Wostl et al. 2011b: 294). But perhaps more important in terms of explaining IWRM was the overarching idea that the problem was not lack of water or technology, but the way we were dealing with it (Pahl-Wostl et al. 2011b: 294).

Water also became an important issue on the international arena. Savenije and Zaag (2008: 293) list the important international meetings as evidence that water was receiving more attention. Some of the events leading up to the Dublin Conference and the Earth Summit are shown here (Table 2).

Table 2: Water on the International Agenda

Year(s)	Event
1965-1974	International Hydrological Decade
1966	Helsinki Rules on the Uses of the Water of International Rivers.
1977	UN Water Conference, Mar del Plata
1981-1990	International Drinking Water Supply and Sanitation Decade
1987	World Commission on Environment and Development submits Brundtland report ("Our Common future")
1992	International Conference on Water and the Environment, in Dublin
1992	United Nations Conference on Environment and Development (UNCED), in Rio de Janeiro
1994	UN Conference on Population and Development, Cairo
1996	Global Water Partnership (GWP) established
1996	World Water Council established
1997	Commission on Sustainable Development submits water assessment report
1997	First World Water Forum, Marrakech
2000	Second World Water Forum, The Hague
2000	World Water Commission on Dams submits final report
2000	United nations Millennium Summit
2001	International Conference on Freshwater, Bonn
2002	World Summit on Sustainable Development, Johannesburg
2003	Third World Water Forum, Kyoto
2004	ILA adopts the Berlin Rules on Water Resources

(Savenije and Zaag 2008: 293)

In addition one could add the conference in Stockholm in 1972 (Gleick 1998), the establishment of UN Water in 2003, the Water for Life Decade 2005-2015, as well as the UN-International Year of Water Cooperation 2013 (UN Water 2013). Today, a great number of warnings about water scarcity and how we are essentially running out of the resource exist.

One example from the UN: "Water scarcity already affects every continent. Around **1.2 billion** people, or almost one-fifth of the world's population, live in areas of physical scarcity[3], and 500 million people are approaching this situation" (UN Water 2007: 4). Multiple books on "water crisis" have also been published in recent years (Biswas and Tortajada 2010: 131).

However, in terms of understanding the resource, a view has emerged that the problem is not the amount of water available, but the way it is used which is the most important. Biswas and Tortajada (2010), claim that the focus on a water crisis is largely mistaken. According to them we are not dealing with a resource that will eventually run out such as gas or oil. Rather, while other resources have been subject to increasing demand and as a result have become more expensive fostering efficient ways of using them, water on the other hand has been subject to poor policies and governance practices. The understanding of water has changed from seeing water as something we can tame and put into our ownership, to the idea that it is something borrowed that we must care for, and that one cannot necessarily think of society as separate from this natural resource. This new way of thinking is what I will refer to as a new paradigm when it comes to managing water.

3.1.2 A New Paradigm

There is much talk of a paradigm change within water management but what specifically is viewed as a paradigm change differs somewhat. J. A. Allan (2003, 2005) explains the changing understanding of water not as one paradigm change, but as a series of paradigm changes, happening over the last one and a half centuries or so. In the first paradigm, water use was relatively low as a result of limited technology and organizational capacity. However, in the late 1800s one experienced a paradigm change when one entered the "industrial modernity" and embarked on what Allan calls the "hydraulic mission". The hydraulic mission can be explained as the idea that nature can be controlled through science and technology, expressed specifically in large scale water systems like dams and canals (Yazdanpanah et al. 2013: 1614). In this paradigm, nature was to be controlled by science and industry to make it available for economic and social purposes (Allan 2003: 6). Technology was used to increase fresh water abstraction, and engineers were solving people's problems by helping them take

[3] "Physical scarcity" is used to describe a situation where there is not enough water for all uses, including the environment. This is opposed to "economic scarcity" where the water is present, but the community lacks the resources to access it sufficiently (IWMI 2007: 11).

more water into use and produce more food and other items (Allan 2005: 188-189). Then, in the mid-70s, the Green Movement in the United States alerted people to the idea that one was not only controlling the water, but perhaps damaging it (Allan 2003: 4). Here we enter the "green paradigm" (2005: 189-190). This is where, according to Allan, the North and the South took different paths; the North left its hydrological mission, while the South remains in a paradigm were the goal is to take more water out of the environment in order to increase food production to meet national demands and to better the national economy (Allan 2005: 190). Allan makes this claim based on the amount of water abstracted which arguably tells us little of what ideas are behind. For example lack of technology and food insufficiency could force a country's water abstraction rates up, without really telling us much about the way water is perceived or understood. As Allan himself also notes, the increased use of water made it possible for Southern economies to hugely increase their agricultural production (Allan 2005: 190). So can one really say that this is evidence of a missing paradigm change and not just a response to the reality one is facing as a country? Terje Tvedt (2011) claims that despite the perceived declining popularity of large hydrological projects, the coming decades will present us with the largest projects in history. This can be understood both as the opposite to a new understanding of water, or simply as a need-driven development.

Allan's next two paradigms are the economic paradigm, which he sets to the 1990s and which is "expressed in the message that water should be valued and even have a price and be distributed via water markets" (Allan 2005: 196), and the political and institutional paradigm which begins around 2000. The last paradigm focuses on the political and institutional aspects around water management. It "is based on the notion that water allocation and management are political processes" (Allan 2003: 11). In other words there are several influences—considering the environment, thinking in terms of economic value, and considering the society involved in the management—which have led to changes in paradigms.

Others acknowledge the different influences Allan talks about, but see them as all feeding into one change, one new paradigm. According to Peter Gleick (1998), one began to move away from the paradigm of the 20th century "which was driven by an ethic of growth powered by continued expansion of water supply infrastructure". In the face of problems affecting people and the environment, water organisations and experts began to look to new approaches which

"incorporate principles of sustainability and equity" (Gleick 1998: 571). According to Gleick, the old paradigm focused on increased economic development, and increasing the available water, but failed to address basic human needs, ecological requirements, what part communities and culture play, as well as what is needed for the future (Gleick 1998: 571).

The old paradigm produced both benefits and drawbacks. Being able to meet growing and moving populations with the required food and water, and protect them from floods and the impact of droughts has come at social, economic and environmental costs. What is more, there are still millions of people without the water they need (Gleick 1998: 571-572). Gleick claims that in the old paradigm one has forgotten to look at environmental and ecological impacts of water management, and by focusing on the supply of water one has forgotten the *use* of water. Gleick (1998: 572) talks about "an ethic of sustainability" which means changing the way one thinks about water. Gleick explains that one is now focusing on demand to fit the supply as opposed to the previous approach of fixing the supply to fit the demand. One way of doing this according to Gleick is to determine "what kind of water future we want" and then model our management accordingly (Gleick 1998: 572).

Another way of explaining this change over time, is the "turning of the screw", the idea that one first tries to get *more* water, then tries to get more *from* the water one has, and then tries to reallocate the water to the "best" uses, for example importing something that can more easily be produced elsewhere (FAO 2004: 11-12). Naturally this is no easy task, raising questions of who gets to decide what is best, and what the criteria for this are. However, the point here is the change, a change from thinking of water as something separate from society which you can always get more of by working harder or digging deeper, to the idea that one has to work with what one has. Ohlsson and Turton (1999), who came up with the image of a turning screw in water management, wished to point out that scarcity is essentially a question of society's ability to deal with it. Consequently, they see the changes as happening, not as one common paradigm change, but individually as countries have to adapt, depending on their situation. They conclude that scarcity should be measured as "social water scarcity" which takes into account, not only how little water there is, but also the society in question's ability to adapt to this (Ohlsson & Turton 1999). In this way they present both the change of

supplying water from the thought of getting more to dealing with what one has, and also the way of thinking of scarcity as something created and to be dealt with by society.

Savenije and Van der Zaag (2008) see the change within water management from the 60s till today as the following: First, in the 1960s-1970s, the focus was on water as a resource to be exploited—leading to a focus on infrastructure and delivery and projects happening without reference to each other. Then in the 1980s-1990s one realises that water can be overexploited and begins to look at adverse effects of exploitation and in general trying to see the big picture. Then, from the 1990s to the present you have water as part of "an overall policy for socio-economic development, physical planning and environmental protection, focus on sustainability and public participation" (Savenije & Van der Zaag 2008: 293). Like with the turning water screw, these three stages can also be divided by one paradigm change, where the last stage is just a broadening of the second one.

Yazdanpanah et al. (2013) explain the paradigm change as a broader societal change from what they call first modernity, to second modernity. In the first modernity, the world is seen as a "safe, secure, and predictable place" (Yazdanpanah et al. 2013: 1607), where humans control nature through science in order to achieve economic growth. In this view, water is a commodity and a resource for human use which has no intrinsic value. As the first modernity stems from the enlightenment, science and "experts" have central roles and technology driving economic growth is at the centre. The role of the state is quite different in the two paradigms. While the first modernity has a centralized state in charge of making decisions, the second modernity emphasises decentralisation and shifts the role of the state to the actors collectively (Yazdanpanah et al. 2013: 1608). In the second modernity, the view of nature changes as a result of emerging "awareness of the limitation of our resources" society has become more critical and focuses on sustainable development as well as democracy (Yazdanpanah et al. 2013: 1611). The second modernity brought on a society concerned with risks and the uncertainty of the future. People rejected the old paradigm because risks were perceived to be impossible to control, science was viewed with scepticism and experts were no longer believed to have the solutions, instead all actors should be involved (Yazdanpanah et al. 2013: 1608-1610).

While humans and nature are seen as separate from each other in the first modernity, humans are viewed as part of nature and water management in the second modernity. According to Yazdanpanah et al (2013), the second modernity differs from the first in that it is based on the idea that "water cannot be isolated anymore from social systems" (Yazdanpanah et al. 2013: 1615). Now, water management must focus on the "interconnections between social, cultural, religious and technical aspects of the production system". Yazdanpanah et al. (2013) call the first the agriculturalist's viewpoint, while the second is the ecologist's viewpoint. While the first agriculturalist values the control of nature and strives to make nature useful to man, the ecologist "considers the intimate, mutually benign processes occurring between man and nature" (Yazdanpanah et al. 2013: 1611). If "considers" refers to the value of the ecologist and that he also tries to achieve some result through nature, it is hard to see how all the processes between man and nature can be considered "benign" for both parties. Likewise, it is hard to see that a benign process for humans would not be anything considered useful (the notion of sustainability could for example mean usefulness over time), and also that it would not require some form of control over nature. However, as Yazdanpanah et al. (2013) have pointed out, these are idealized types. To say that a society which manages its own water is isolating water from the social system seems self-contradictory in many ways. Perhaps Yazdanpanah et al. are thinking of not only large-scale water projects which make it hard for the individual to experience "the mutually benign process occurring between man and nature" (Yazdanpanah et al. 2013: 1611) but also water management which is *imposed* on a society, either from the outside or from the top. This does perhaps explain some of the focus of second modernity on democracy or participation. The authors' point is not to say that the first modernity is one big mistake, but to show that this approach to water management, which has been hugely beneficial in terms of growth and prosperity, is also the cause of current vulnerability and a threat to sustainability (Yazdanpanah 2013: 1618).

Schoeman et al. (2014) also see the paradigm change as focusing on including stakeholders, thinking across sectors and disciplines, and understanding the various values water can have – economic, ecological and cultural. This change is explained by the authors as a result of people seeing the effect humans have on nature and the environment. The old paradigm is characterised by centralised institutions seeking to maximise the use of the resource and solving problems with experts and technical solutions. This has however failed to secure

sustainable and equitable solutions. The new paradigm instead is characterised among others by thinking about problems as unpredictable, understanding the close link between society and the environment, focusing on ability to change and on the sustainability of the resource (Schoeman et al. 2014: 2-3).

All the authors mentioned above describe the same change, but they differ in how they approach it or what they focus on. For example, Gleick emphasises economic development as a belonging to the old paradigm, while Allan sees including water into this development by giving it economic value as part of the paradigm change. While Gleick sees the paradigm change as "new approaches […] being explored by national and international water experts and organizations" (1998: 571), Yazdanpanah et al. (2013) sees the change into second modernity as moving away from the experts. In terms of the water screw, the idea that water can be re-allocated to better uses sounds like difficult decisions to make if everyone was to be involved. Gleick talks about modelling our behaviour depending on what vision we want. The question then becomes if this is the future everyone wants. The same could be said about risks one defines. As Yazdanpanah et al. 2013 explains that the second modernity saw a society increasingly preoccupied with risks. The authors presented here also have differing views considering what they define as a risk. While Gleick (1998) sees that risks are the basic need for humans and the environment; Ohlsson and Turton (1999) stress that what is a risk depends on the society's needs and abilities. According to Gleick, it is the old paradigm (relying on technical solutions and engineers) which has been exported "to many parts of the world" (Gleick 1998: 571) and is now attempted stopped when one has begun to realise the adverse effects. This is slightly different from Allan (2003; 2005), and Ohlsson and Turton (1999) who explains the old paradigm almost as a natural occurrence everywhere.

3.1.3 Summing up

Regardless of the different presentations of a paradigm change, we see that the literature is largely in agreement on the fact that there a new water paradigm has emerged or is emerging. While a change might not be happening all over the world simultaneously, and while these ideas are not inventions of the West or the 21st century, it has become a prominent way of thinking in big international organizations and fora. The basic idea within this general trend includes seeing water as one connected resource with a fixed amount, considering the environment as a rightful user of water, and seeing humans and water as part of the same

system. This represents not just a new way of dealing with water, but a new way of understanding the resource. Sandra Postel (1997: 185) sums this up nicely in what she calls "a water ethic"—a term I will borrow for this thesis. Postel stresses that it is not enough to respond to the realised failure of engineering and the idea of constantly getting more water, by only applying various water-saving measures and increasing the efficiency of water use. "Adopting such an ethic would represent a historic philosophical shift away from the strictly utilitarian, divide-and-conquer approach to water management and toward an integrated, holistic approach that views people and water as related parts of a greater whole" (Postel 1997: 185). In addition there is the focus on people, their right to water, and their right to decide how this resource is dealt with. IWRM can be seen to be coming out of this paradigm. IWRM is specifically mentioned as an example of Allan's fifth paradigm (Allan 2003: 4), and Savenije and Van der Zaag (2008) also see the emergence of IWRM as a new stage in the development, or change in paradigm of how we think about water resources. IWRM has "evolved as a response" (Schulte et al. 2014: 19) to what was seen an approach which did not consider trade-offs in use, nor the opinions of various water users (Schulte et al. 2014: 19).

3.2 IWRM—A Solution to All Problems?

In the international world of water management, Integrated Water Resources Management (IWRM) has become immensely popular (Biswas 2008; Nesheim et al. 2010; Molle 2009; Jeffrey & Gearey 2006). For better or for worse, IWRM has become the norm or "the only game in town" (Jeffrey & Geary 2006: 2). Before I turn to the problem of defining IWRM, I will briefly give a picture of how the concept has been gaining recognition over the past years.

3.2.1 The Emergence of IWRM

Many see the Dublin Conference of 1992 and the establishment of the Global Water Partnership as two of the main events which signal IWRM's entrance onto the international political agenda (see for example, Rahman & Varis 2005; De Stefano 2010: 2449). The Dublin conference was set up in anticipation of the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, the so-called Earth Summit in 1992. The International Conference on Water and the Environment in Dublin was organized

by the international water sector. The focus here was on sustainability and the environment. The Brundtland report "Our Common Future" had just come out, and the conference itself was in preparation for the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, also known as the Rio Summit (FAO 2004: 6). At the Dublin Conference over 500 water experts appointed by governments, or from national or international organisations or from the United Nations—in other words not government delegations—came together to make the Dublin Statement (Rodda 1995: 5).

The Global Water Partnership (GWP) is one of the three organizations which according to Finger and Allouche (2002: 37) are the main NGOs that emerged after the Dublin Principles, the other two being the World Commission on Dams and the World Water Council. The World Water Council, an international water policy think-tank was also created in 1996 as a result of a proposal made at the Dublin Conference, and was created by a number of water organisations. The WWC mainly organises the World Water Forum, which aims to raise awareness on water issues, give a platform for exchanging opinions and information, and promote policies, as well as present knowledge (Finger & Allouche 2002: 42).

The GWP was officially inaugurated in 1996. It aims to connect all the actors working in the water sector, and development agencies, the private sector, international organisations (governmental or not), professional associations as well as academics can be members (Finger & Allouche 2002: 38). The highest body of the GWP is the Consultative Group, which according to Finger and Allouche "is basically a forum for debate" (2002: 39). Then there is the Steering Committee functioning as an executive body. The Technical Advisory Committee consists of twelve "water professionals and scientists" who provides scientific advice to the Consultative Group, and works with countries recommending water management approaches (Finger & Allouche 2002: 39). The fourth body is the Secretariat, based in Stockholm who administers the organisation. The GWP is an umbrella organisation offering technical assistance, mobilising funding, and international expertise. It works nationally and also regionally "encouraging governments, aid agencies, and other stakeholders to adopt mutually complementary policies and programmes" (Finger & Allouche 2002: 40).

While the Dublin Conference and the GWP placed IWRM firmly on the international agenda, it is often noted that the concept is much older than this (Biswas 2004; 2008; Priscoli 2013). For example, the Tennessee Valley Authority (TVA), established as early as 1933 to control the river system as a whole through a series of dams and reservoirs while at the same time creating improvement in agricultures, forestry, education health and sanitation can be seen as one case of IWRM (Molle 2008: 140). Rahman and Varis (2005: 15) mention German water management in the 60s or even Spanish water tribunals as early as the 900s. As the Food and Agriculture Organization of the United Nations (FAO) explains, because of the many ways integrated water management can be understood, one can probably find examples of some form of it way back in history (2004: 3). Considering the paradigm change explained in the previous chapter, and seeing IWRM as growing out of this, it is not surprising that many examples could be considered early integrated water resources management.

If we see IWRM as growing out of what I have previously called a new understanding of water, we can also see a wide range of things that potentially could be integrated into the way one deals with water. The preceding chapter has shown one example of how various ideas within water management have dominated different decades, focusing either on technology, the environment, society or administration. This change over time can possibly explain the broadness and great variation of things that fall under the "IWRM" phrase.

Even if the ideas of IWRM appear not to be new, there is still some novelty to the concept as it is today. Quotes such as "IWRM is dominant method, frame work of today" seem to suggest that there is talk of a concept, which although rooted in historical changes, is perceived as something new. A quick search in the journal database ISI Web of Science for example, retrieves 413 articles which have the abbreviation "IWRM" as a topic or as a title, with the earliest being from 1999, as opposed to articles with "water management" as title which go back to 1890. So as a concept (not as an idea) we can maybe say that we are dealing with something new.

Giordano and Shah's (2014) differentiation of "integrated water resources management" and "capitalized IWRM" is helpful here. They see integrated water resources management as something which provides "a set of ideas to help us manage water more holistically" (Giordano & Shah 2014: 1) but that these ideas have been codified into: "in capitals,

Integrated Water Resources Management (IWRM), with specific prescriptive principles whose implementation is often supported by donor funding and international advocacy" (Giordano & Shah 2014: 1).

So while Priscoli (2013) describes the claim that IWRM is new, as "collective amnesia" of something that has been present for long, the point here, is not to deny that the basis for IWRM is older than for example the Dublin Conference, rather that the conference can be seen as an instance of codifying IWRM. This perhaps helps us when investigating it, in that it is a new concept we are investigating, not every single old idea. As Schoeman et al. (2014: 3) put it: "While a paradigm, by nature, involves unconscious assumptions and mental models, the new water paradigm has manifested in conscious operational concepts such as IWRM".

With the popularity of IWRM, criticism has also followed. According to Giordano and Shah (2014: 1), while the ideas provided by integrated water resources management are good, this new concept (capitalized IWRM) has, after Agenda 21 and the Dublin Conference, become in the authors' opinion an end in itself consisting of specific approaches. Moriarty et al. (2011: 122) claim it has become a "standard package of water reform which is being promoted. Biswas (2008) emphatically criticises the idea that one concept can be applied to the vastly different situations and contexts that exist all over the world.

However, while a concrete concept or standard package could be evaluated, criticised and maybe improved, perhaps the biggest reproach against IWRM is that it is still very unclear what it actually means. This makes it easy for people to embrace the concept because it can mean what they want it to, and it also renders it of limited use as it becomes unclear how to implement it, and how to evaluate it. As Biswas (2008) argues, the concept as it lacks a definition and hence cannot be evaluated to say whether it is improving a situation or not. The next section deals with this criticism of IWRM, and argues that despite the un-clarities, IWRM can to a certain extent be defined by the Dublin Principles and this definition can be used to evaluate and also explain the potential of IWRM.

3.2.2 The Problem of Defining IWRM

As IWRM receives increased attention and support from various organizations, naturally the need to define it occurs. Although many people agree upon the Dublin Principles as a *foundation* for IWRM (Calder 2005: 113), coming up with a clear definition for the concept

of IWRM is more difficult. The existing definitions of IWRM, they vary and there is no consensus on one definition (UNEP 2010: 5; Biswas 2004: 248; Bandaragoda 2005: 3). Two definitions which are often referred to are those of the Global Water Partnership (GWP) and the USAID (see for example Merrey 2008: 900). The GWP defines IWRM as "a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare without compromising the sustainability of vital environmental systems" (GWP 2012). The USAID have a different definition. According to a report they have published the

> *USAID defines IWRM as "a participatory planning and implementation process, based on sound science that brings stakeholders together to determine how to meet society's longterm needs for water and coastal resources while maintaining essential ecological services and economic benefits." A key tenet of IWRM is conventionally considered to be its focus on integration of different water uses (domestic, agriculture, industry, environmental, etc.). Further, it is generally considered a quite broad and encompassing term"* (USAID 2011: 26).

The more encompassing definition, quoted by Merrey (2008: 900), but no longer available on USAID's webpages reads:

> *Integrated Water Resources Management (IWRM) is a participatory planning and implementation process, based on sound science, that brings stakeholders together to determine how to meet society's long-term needs for water and coastal resources while maintaining essential ecological services and economic benefits. IWRM helps to protect the world's environment, foster economic growth, and sustainable agricultural development, promote democratic participation in governance, and improve human health. Worldwide, water policy, and management are beginning to reflect the fundamentally interconnected nature of hydrological resources, and IWRM is emerging as an accepted alternative to the sector-by-sector, top-down management style that has dominated in the past.*

As we see the definitions of USAID and the GWP are similar, but not quite the same. They both carry elements of economic growth or welfare, environmental sustainability or protection, as well as a coordinated or non-sector based management of water resources. Their focus however, is somewhat different. Looking at the definitions we can see that USAID focuses on participation, not only in management but also in planning. According to them, management should not be top-down; democratic participation in governance should be

promoted, and stakeholders should "determine how to meet society's long-term needs". This element is not included explicitly in the definition of the GWP. Merrey (2008: 900) considers the USAID definition more idealistic, and I would agree as it incorporates more elements, such as agricultural development, human health, and democratic participation in governance. Furthermore, while USAID sees IWRM as a way to foster economic growth and agricultural development *and also* protect the environment, GWP sees IWRM as a way to maximise economic and social welfare *within* the limits of the environment. Moreover, USAID sees IWRM as a process which actually "helps to" protect the environment, foster growth and development as well as promoting participation, while the GWP sees IWRM as a process which simply "promotes" a type of coordination and management. The most frequently cited definition however, is that of the GWP (Molle 2008: 132). According to the FAO this is also the first authoritative definition (2004: 11); it is also the definition referred to in recent papers by the UN and is regarded as "widely accepted" (UNESCO 2009: 3). However, the GWP is not entirely consistent and in addition to the official definition mentioned above, the organisation's website also states that "IWRM is the coordinated development and management of water, land and related resources in order to maximise economic and social welfare without compromising the sustainability of ecosystems and the environment" (GWP 2a). This is different from their definition where IWRM was described as "a process promoting" the above.

In chapters 18.8 and 18.9 in *Agenda 21* from the Earth Summit (United Nations 1992), we find the following definitions of IWRM: In chapter 18.8, that water has to be protected as it was a natural resource and a social and economic good, making sure the basic needs of people and the environment were met, and charging users beyond that. Chapter 18.9 states that IWRM should happen on a catchment basin or sub-basin level and that when it is carried out one should strive to achieve four things. First, to integrate technological, socio-economic, environmental and human health considerations, when one was managing the use, identification or protection of freshwater resources. Second, to use water sustainably "within the framework of a national economic development policy" (United Nations 1992). Third, there should be full public participation in water management policymaking and decision-making. And fourth, to "identify and strengthen or develop, as required, in particular in developing countries the appropriate institutional, legal and financial mechanisms" so that

water policy and the implementation of water policy brings about "sustainable social progress and economic growth" (FAO 2004: 9-10). Agenda 21 differs from the definitions of the GWP and USAID in that it equates people and the environment, and it is needs based, as opposed to the maximising or output based definitions of the USAID and the GWP (United Nations 1992, § 18.8).

Having different definitions for one concept might naturally lead to misunderstandings, however this is only one part of the problem of defining IWRM; another is that the definitions themselves lack clarity. This makes it difficult both to implement the concept as well as evaluate it. "The broadness and sometimes vagueness of the IWRM concept hampers the definition of coherent assessment initiatives" (De Stefano 2010: 2461). According to Biswas (2004: 250) IWRM cannot be implemented due to problems with operationalization and measurement criteria. Molle (2008) and Biswas (2004) point out that the vagueness of IWRM also makes it likely that someone "hijacks" (as Molle calls it) the concept and uses it for their own purposes. Jønch-Clausen and Fugl (2001: 502) for example claim that IWRM might have "degenerated into one of these buzz-words that everybody uses but that mean many different things to different people". According to Mehta et al. this is precisely what makes IWRM popular, as it more or less can mean what one wants it to.

3.2.2.1 IWRM as a goal, or as a way of achieving a goal

One confusing aspect of IWRM is that it is dealt with both as a goal, and as a way of achieving that goal. This makes it hard to grasp the concept in the first place, and also raises some questions on aspects of governance. Cardwell et al. (2006), explicitly claim that IWRM is a process and not a goal. As they see it, management "is not a goal in itself, but the process used to achieve goals" (Cardwell et al. 2006: 9). The GWP on the other hand deals claims "that IWRM is not an end in itself, but rather a means to achieve the three key strategic objectives of economic efficiency in water use, equity, and environmental and ecological sustainability" (UNEP 2010: 3-4). Even so it is hard to see how these goals can be separated from IWRM itself, as IWRM by definition is a way of achieving quite specific goals. There is probably no clear answer to this confusion, but the point here is simply to illustrate that the literature presenting and discussing IWRM sometimes treats IWRM as a goal, and other times as a way of achieving a goal and that these goals, and ways to achieve them, are so interlinked that that separating the two becomes difficult. Instead it would seem IWRM is dealt with both

as a set of goals and the ways to achieve them—something which not only makes the concept hard to grasp, but also affects aspects of governance and participation.

According to Lautze et al. (2011: 2) the term "governance" is in general used inconsistently and with various definitions. It is used to refer to both a process and the outcome. According to them, governance is the processes and the institutions that define the goals of management. In other words, management tries to achieve the wanted outcome, and governance defines what outcomes one wants. In terms of IWRM and the definitions of the GWP and USAID, this makes the two definitions very different from each other. USAID talks about a "participatory planning [...] process" where the stake-holders are the ones to decide what one is trying to achieve. This then is in line with the definition of governance, and to some extent avoids the problem mentioned by Lautze et al. (2011) who criticise IWRM for having too much laid out already without letting the people governing make these decisions. Lautze et al. point out that while one can easily imagine water governance as a part of IWRM, this washes out much of the elements of governance (2011: 5). According to them, IWRM, has several pre-defined goals, but defining goals is what governance is all about. Their definition of governance is "processes and institutions for decision-making" (2011: 3) and as they put it: "how participatory can a planning process be if the goals are pre-determined by IWRM constructs" (Lautze et al. 2011: 5). They criticize GWP's co-opting of the term governance, by seeing it as a way of achieving goals, when according to them; it should be about setting goals (Lautze et al. 2011: 5). The GWP claims that: "IWRM leads toward the recognition that water policy is bound together with government policies on security, economic development, food security, public health and other essential governance missions" (GWP 2012). However, it is hard to understand how IWRM, as defined by GWP, can lead to any type of recognition. After all it is a process that attempts to maximize economic and social welfare while at the same time looking after the environment, by promoting coordination. This sounds more like it *requires* the type of recognition mentioned above, than that it leads to it. Surely, at least someone driving this process needs to already recognize this in order to promote the coordination that their definition talks about.

Contrary to what Lautze et al. (2011) said, Van der Zaag argues that IWRM "essentially deals with *decision-processes*" (Van der Zaag 2005: 869 italics in original) in other words what one

could call the governance. As he puts it: "the implementation of IWRM requires real participation of stakeholders and transparent decisionmaking processes. […] As such, good water governance lies at the heart of IWRM" (2005: 870). Currently one is educating a new type of "water managers" as he calls them, who will communicate with stakeholders and decide what the problems are, and facilitate their resolution. Following the criticism of Lautze et al. (2011) in reality leaves little power to those forced to resolve a problem they might have identified as something else. As Reed (2008) explains about participation, "If a decision has already been made or cannot really by influenced by stakeholders, then participation is not appropriate". Or as he also says: "When implementing a participatory process, stakeholder participation should be considered right from the outset, from concept development and planning, through implementation, to monitoring and evaluation of outcomes" (Reed 2008: 2422).

3.2.2.2 Vices and Virtues of Vagueness

The fact that IWRM is hard to pin down to one specific explanation and is regarded differently by different scholars. While some scholars, like Biswas, hold that the concept loses its value when it is too vague, others see it as a valuable way of guiding water management. According to Van der Zaag, IWRM is "a perspective, a way of looking at problems and how to solve them" (2005: 868). And therefore, he argues that IWRM plans "must be pragmatic and practical instruments, that indicate how the available financial, institutional and human resources will be used to achieve tangible results" (Van der Zaag 2005: 869). Van der Zaag sees pursuing IWRM as the answer in order to achieve a holistic management of water resources which he sees as a necessity to reach the millennium development goals (Van der Zaag 2005: 868). According to him, "Integrated water resources management means reconciling basic human needs, ensuring access and equity, with economic development and the imperative of ecological integrity, while respecting transboundary commitments" (2005: 868). Van der Zaag does not explain how these elements are related, merely that they are all part of IWRM. Mitchell (2004: 398) is not much different, he claims that IWRM can be seen as something which "ought to be", to stretch for; not necessarily a prescription for how to do things. Mitchell says it is all about IWRM providing a framework within which to consider different approaches. Along the same lines, Rached and Brooks (2010: 149) claim that "Though IWRM has been criticized because of the enormous difficulties of implementation

[…] it is nevertheless a useful way to stimulate deeper thinking about water policy" (Rached & Brooks 2010: 149).

Merrey (2008) criticises how one defines IWRM in terms that make it impossible to disagree with; for example the focus on promoting democracy and protecting the environment. In his opinion, there is really nothing to discuss as most people would naturally agree that these are 'good' things (Merrey 2008: 900). Merrey likens it to a religious text which provides a statement of unquestionable faith people can rally around (Merrey 2008: 900). According to Merrey (2008), the problem with IWRM, apart from being like a religious text and being very undefinable, is that it does not lead to any action. There is also the broadness of the concept. As Merrey (2008, 901) puts it, "IWRM seems to be understood by many of its adherents as a means to achieve several desirable goals simultaneously: providing safe drinking water, meeting ecological needs, providing water for productive uses, and reducing poverty". This way of thinking about IWRM comes close to what Molle (2008) dubs a "nirvana concept". Nirvana Concepts "embody an ideal image of what the world should tend to" (Molle 2008: 132). While the chances of actually getting there are low, it is deemed such a good situation that one should at least try.

3.3 A Current Form of IWRM

What IWRM is, is in other words highly contested. As we have seen the concepts vagueness for many means that one cannot implement it at all. Or that one does not know if one is to implement it or what. While Biswas (2004b) for example, argues that the Dublin Conference which produced the principles was itself relatively unimportant, the principles have to some extent become a point of definition. While by no means everyone agrees on the Dublin Principles as a basis for what IWRM is, these principles are referred to considerably by scholars who are investigating IWRM. Examples from recent literature include Yu et al. (2014), Michaud (2013), Butterworth et al. (2010), Manyanhaire and Nyaruwata (2014), Hill (2013), Mehta et al. (2014), Wolff et al. (2012), Pahl-Wostl et al. (2011).

I will here first list the principles of the so-called Dublin Statement from the International Conference on Water and the Environment in Dublin, in 1992. According to Calder (2005: 113), these principles are generally agreed upon as the foundation or basis for IWRM as

opposed to a definition of IWRM which is widely contested. I will argue that by using the Dublin Principles as a starting point one can gain an understanding of IWRM which avoids some of the confusions mentioned, and which lets us investigate the concept through the following stages of this thesis. I will explain what the main elements of the concept are and how these are hierarchically related to each other.

3.3.1 The Dublin Principles

The four principles set down in Dublin in 1992 are listed in Table 3 below.

Table 3: Dublin Principles

Principle No. 1 – Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment

Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

Principle No. 2 – Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels

The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

Principle No. 3 – Women play a central part in the provision, management and safeguarding of water

This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangement for the development and management of water resources. Acceptance and implementation of this principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision-making and implementation, in ways defined by them.

Principle No. 4 – Water has an economic value in all its competing uses and should be recognised as an economic good

Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognise the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

(Dublin Statement 1992)

These principles were set down at the International Conference on Water and the Environment in Dublin, in 1992. The results from the Dublin Conference were endorsed at the Earth Summit in Rio de Janeiro the same year, and incorporated into the Agenda 21 which was the outcome of the summit (FAO 2004). After the two conferences in Dublin and Rio de Janeiro, several international and national agencies made changes to their water policies. One example is the World Bank which, although not actually using the phrase Integrated Water Resources Management, made a new policy in 1993 (FAO 2004: 10). IWRM was in many ways recognized internationally as important when, in 2000, the UN General Assembly adopted the Millennium Goals Declaration and the same year the EU adopted the EU Water Framework Directive. Both requested member countries to "apply IWRM principles and establish 2015 as a deadline for the achievement of a real change in water policy" (De Stefano 2010: 2450). At the 2nd World Water Forum, in 2000 in The Hague, 113 countries adopted the concept of IWRM and committed themselves to ensure "water security" (Savenije & Van der Zaag 2008: 295). In 2001 there was the International Conference on Freshwater in Bonn. There, where 50 states signed the declaration, they agreed that: "For sustainable development, it is necessary to take into account water's social, environmental and economic dimensions and all of its varied uses. Water management therefore requires an integrated approach" (Hübschen 2010: 15). According to Hübschen (2010: 16) this was then used for the World Summit on Sustainable Development in Johannesburg where "IWRM was finally confirmed as the new global model in the water sector".

3.3.2 Mapping the components of IWRM

How then can one investigate the potential of a concept which is interpreted so broadly and differently? As we have seen, to many of those explaining what IWRM is, it is a goal—an ideal situation to arrive at or strive towards, or is it the way of getting there? I would argue it is both. By examining the Dublin Principles, which I will argue are a good starting point for determining what IWRM is, one can see that it is put together of many things, some which are more a process, others which are more a goal. Instead of choosing one definition which only conveys part of the concept, IWRM can be deconstructed into different elements. It is then possible to evaluate each element individually as I will show in this chapter.

The Dublin Principles can, be split into several elements which can be divided into three categories: beliefs, concrete goals, and tools. As shown in the matrix below, these categories

are connected hierarchically to each other. What I mean by this is that the elements feed into each other and vary in importance. For example, a "tool" is a way of achieving a "goal". So should one discover that it is an inefficient way of achieving a goal, it is reasonable to assume that the tool could be discarded and an alternative sought. The goals however, are goals in themselves and if they should be inefficient or difficult to achieve, they are still desirable. They can of course be questioned but by and large they are the result of the beliefs represented in the matrix. These beliefs, which all stem from the new water ethic, are the basis for the entire concept and are not up for discussion. For example, if it is proved that treating water as an economic good is does nothing to further the goal of demand management; naturally it makes sense to revise this tool. This does not change even if in reality a particular tool or goal is a favourite of policy makers and might persist despite limited effect. The hierarchical structure is still the same: a tool is there to get us to our goals which in turn are dictated by our beliefs. This in no way means that all people agree with these beliefs (as much has already been pointed out in the chapter on a paradigm change), but it does mean that any discussion about the goals and tools assumes a shared belief base. For example, if a person does not believe that water is finite, conservation might seem completely unnecessary; this shows how the goals depend on the beliefs. If on the other hand a person disagrees that recognising water as an economic good is the way to conserve water, this is different. This would be a disagreement focusing on what the best way to reach a common goal is, not what that goal is in the first place. In the matrix below I have mapped the different elements of IWRM as it is presented by the Dublin Principles and sorted them according to each other. The point is to illustrate how they are connected, and while I have chosen a layout which I feel represents these connections best, there are probably several other ways to map the elements[4].

[4] While many of the elements in this matrix are perhaps best explained as "concepts" of some sort, but as the word "concept" has been used for IWRM in its entirety, to avoid any confusion, I will refrain from the word "concept" and continue to use the word "element" to describe the individual tools goals and ideas found in the matrix.

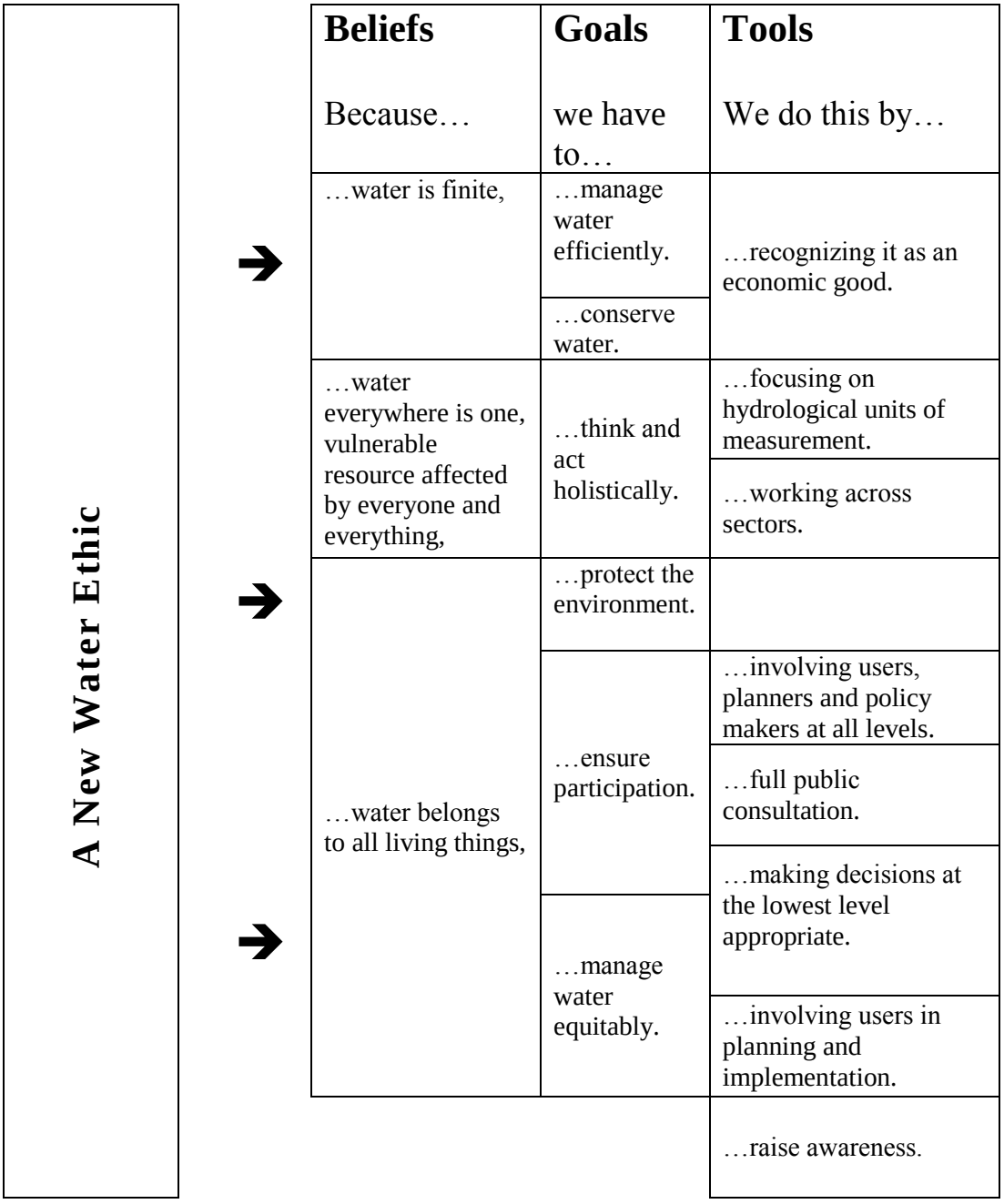

Figure 1: The Components of IWRM

To explain the elements in the table above, and why I think they can be grouped into the three different categories as I say they can, let us start with what I have called "a new water ethic". This overarching ethic or vision can be broken down into three components, what I have

called beliefs, which both reflect beliefs based on knowledge, as well as on values. As these beliefs feed into the rest of the elements, "a new water ethic" might be considered more of a foundation than an element, but it is still a part of the concept and for the sake of simplicity I will refer to it as an element also. The first is the idea or understanding that water is a finite resource; based on a prevailing view of the hydrological cycle. The second belief expresses the understanding that water flows from user to user, and what one user of this finite resource does, will affect the other users. This is then especially important at a time when a substantial amount of water is being used, which is also reflected in the belief that water is vulnerable. What I mean by this is that vulnerability is really not an issue when it comes to the resource itself—water is seldom damaged beyond repair—it is the use of water (especially short-term) which will suffer when the available quality or quantity of water is "harmed". The third belief is the value-based belief that water belongs to all living things. This is belief reflected in the statement that it is "the basic right of all human beings to have access to clean water and sanitation" (Dublin Principle 4, see page 45); and that the environment must be protected when one pursues social and economic development, considering all needs and uses because water sustains life (Dublin Principle 1, see page 45).

From these three beliefs we can then move to the next elements—what I have here called "goals". These are specific goals one wishes to reach, which are valuable in themselves *because* one considers them to be connected to the overarching beliefs. One example of this is the first goal "managing water efficiently". This is mentioned in the fourth Dublin Principle which focuses on how to achieve "efficient and equitable use, and of encouraging conservation and protection of water resources" (see Dublin Principle 4, on page 45). If we considered this element entirely on its own, it is not obvious why this should be a goal. However, if you accept that water is a finite resource, and that currently we are using a large proportion of it, it follows that one cannot continuously look for an increased supply, but instead has to manage the use and need of it. The same goes for the goal "conserving water". The goal "thinking and acting holistically" as mentioned in Dublin Principle number one: "effective management of water resources demands a holistic approach", bases itself on the belief that what is done in one place affects the users in another place. If one for example considered the discharge of pollutants into a river and the water abstraction from a well downstream as accessing separate resources, there is no obvious need to think and act

holistically. However, by seeing the two as connected it becomes apparent that the cases should be treated together. Regarding the final three goals (ensuring participation, managing water equitably, and protecting the environment), these can be seen as based on the belief that water belongs to all living things.

Now in order to reach these goals there are specific tools that are recommended. The first, "recognising water as an economic good" is presented in the fourth Dublin Principle as a way to avoid the wasting water, and ensure efficient use. It is also mentioned as a way to ensure equitable use of water, and could be presented as a tool to reach that goal, however it is not immediately clear from the principle how this specific mechanism is thought to work. The second tool "focusing on hydrological units of measurement", or as the first Dublin Principle puts it: "Effective management links land and water uses across the whole of a catchment area or groundwater aquifer"; I would say is a way to ensure holistic thinking. It dictates a view of the resource where everyone affecting it can be taken into account. Likewise, working across sectors avoids wearing blinds to causes and consequences beyond one specific domain.

Then there are the tools which I would argue are related to ensuring participation. These are "involving users, planners, and policy makers at all levels", focusing particularly on the users by stressing decision making at low levels, and the involvement of users in planning and implementation. Public consultation need not necessarily mean the involvement of users, but could also suggest the involvement of those concerned. These tools could also be seen as ways of managing water equitably in the sense that those who use and are affected by the water get to decide on its use. However, this does not necessarily lead to equitable use. As will be discussed in the part on theoretical perspectives, power relations for example can mean that one group can place their claims before another. "Managing water equitably" is explained in Dublin Principle number four as a result of treating water as an economic good. While it can be discussed whether treating water as an economic good would lead to equitable management, it is explained in the Dublin Principles as a way of reaching this goal, a goal which I would say comes out of the belief that water belongs to all living things. Again, I will return to this in more detail, in the part on theoretical perspectives.

Lastly there is "raising awareness" which is an interesting tool, and rather hard to link specifically to one of the goals. While it is mentioned in the Dublin Principles as part of a

participatory approach, I would argue it could almost be characterised as the opposite. It seems instead a tool for guiding the decisions of those participating, and in this way partly addresses the problem mentioned earlier of people who do not agree with the beliefs. It can perhaps be seen as a cornerstone tool, linked more directly to all the beliefs. Depending on how one interprets it as the second Dublin Principle only states "raising awareness of the importance of water". This could and could not refer to the fact that it is finite, that it is affected by anyone or anything that uses it, or that it belongs to all living things.

3.3.2.1 Re-examining the Criticism of IWRM

When we step back and take a look at this matrix, it suggests that talking about IWRM as *one* thing can be confusing, as it disregards the difference between these categories and how they 'feed into' one. With this in mind we may re-examine some of the criticism brought against IWRM. For example, Giordano and Shah criticise the usefulness of IWRM because they find in their case that "Pricing is not the only way to signal scarcity value of water" (Giordano & Shah 2014: 372) and that one does not "need participation" (Giordano & Shah 2014: 372), my point is that they are criticising two different things. One, the point about pricing, is an *interpretation* of IWRM (as defined by the Dublin Principles) it does not say in the principles that pricing is what one is to do. The other, that one does not need participation; this is a criticism of IWRM, and incidentally one that misses its target. Giordano and Shah (2014) claim that participation is not necessary based on their experience in China where a top-down decision left farmers with less water, but these farmers were still able to keep agricultural yields up. Now, this is a perfectly valid and relevant point in terms of the paradigm change, to get more out of the water one has, and as they have shown this does not necessarily require participation. However, from the Dublin Principles we do not get that participation is *needed* to get more crop per drop. As I will return to in the next paragraph in more detail, in the Dublin Principles participation is a *goal in itself:* "Water development and management should be based on a participatory approach" (see Dublin Statement on page 45).

Another example is Merrey's (2008) criticism that IWRM is impossible to disagree with because it parrots what is widely seen as ideals anyway. With the matrix in mind, we can however see that this criticism focuses on only one part of the concept: the beliefs of IWRM. These are precisely what Merrey criticises them for being—a belief, and not the elements that in themselves would lead to action. Rather it is the goals and the way to achieve them which

can lead to or are the action inspired by the belief. Merrey lamented the "prescriptive nature" of IWRM which did not encourage discussion and debate in his opinion. This observation, although pointing to something problematic, is not so surprising bearing the previous discussion of the elements of IWRM in mind. After all, the beliefs of IWRM which is what Merrey refers to leave little "room" for discussion. As I have explained there is a hierarchical structure between the elements, and these beliefs are demanded by the concept as an entirety. If you do not agree with them, consequently the rest will not necessarily apply to you either. So just because Merrey feels it is obvious, does not mean everybody else does and therefore it does make sense to include it as a premise for all future management. However, some modification to that last statement is needed. I am talking here about the understanding of the concept, not any physical implementation. So while a person can be included in a WUA for example, without sharing the beliefs of a new water ethic, the theoretical concept demands agreement with this belief. However, even in real life implementation as we shall see later, discrepancies in belief can become a problem. Mollinga et al. (2007), for example, brings up an interesting point in terms of whether one has to agree with every part of the concept in order to deal with one part of it. According to them the failure to successfully set up well functioning WUAs can be put down to a misunderstanding of what one is doing (Mollinga et al. 2007: 704). Mollinga et al. claim that what one is trying to do when one is reforming agricultural water management, is trying to force social change with the help of blueprints or toolboxes, models or previous experiences. Criticising this approach, Mollinga et al. call for more attention paid to existing institutions as opposed to trying to replace these.

An example of how IWRM is seen as an ideal is found in the UNEP. In 2005 the UNEP launched the *UNEP IWRM 2005 Programme* which aimed at "facilitating the transformation of what was essentially an IWRM 'vision' to a practical, operational IWRM plan" (UNEP 2010: 5). This programme was implemented in 58 countries as a start-up help to IWRM. Here one talks about ideas of what is good, and then tries to find how one can do that in practice. However, if you first sit down and draw up what you think is important way of doing things for the world, then operationalize it into a how-to-get-there plan, and then you start setting out that plan in reality; the people who meet that plan on the ground only meet the plan, and are not presented with the vision. So, you might get them on board with step one in your how-to-get-there plan, but that does not mean that they share the vision. The FAO for example claims

that IWRM requires "fundamental changes in terms of values, beliefs, perceptions and political positions" (FAO 2004: 14). And if one acknowledges that IWRM rests on this new water ethic, it makes sense that IWRM requires "fundamental changes in terms of values, beliefs, perceptions and political positions" (FAO 2004: 14). This touches on Lautze et al.'s (2011) criticism.

Lautze et al. criticise IWRM for having too many pre-defined goals which cannot be changed by participants. Merrey (2008) on his side primarily focuses on the idea that the ideals of IWRM are of little use as no-one would oppose them. Looking at the matrix above it becomes clear that pre-defined goals are indeed one attribute of the concept—especially concerning the beliefs. I would argue that this is primarily what can cause problems, if participants do not share the beliefs of the concept. For the remainder of the thesis I will look at three elements which are particularly interesting for my investigation, and are also a necessary limitation to make: "water as an economic good", "participation", and "a new water ethic".

3.4 Summing Up

IWRM can be understood as a concept which has grown out of concerns about the interconnectedness of water uses, and the sustainability of water supply to people and the environment. I have shown how IWRM can be seen as a concept consisting of several elements and that these elements are hierarchically linked to each other in the structure of IWRM. The elements can be grouped into beliefs, goals and tools; beliefs which prescribe certain goals, and certain tools to achieve these goals, all stemming from a specific view on water: "a new water ethic". From the many elements in IWRM's structure, I have chosen three which I investigate in this thesis; these are "water as an economic good", "participation", and "a new water ethic". The point of describing the structure of IWRM as a hierarchy is to illustrate that the goals and tools depend on the beliefs which are dictated by the water ethic. Treating water as an economic good could be done in a number of ways and by a number of people, but it will achieve entirely different results depending on whether these people share the belief or not. The same goes for participation. The goal that people should decide over their own water resources does not automatically lead to one result; it depends entirely on these peoples' beliefs about the water resource – their water ethic.

4 Theoretical Perspectives

Returning to my previously chosen elements of IWRM, how can they be understood? The Dublin Principles are potentially open for interpretation and different scholars have different ways of seeing and understanding each of the elements, and in order to later investigate their potential in *Wadi Zabid* I must first gain some basic understanding of what these various understandings are. By setting theoretical light on the Dublin Principles, I hope I will be able to understand how the elements are approached differently by the actors at the different stages. I will here give a general overview of the different perspectives on the three chosen elements "water as an economic good", "participation", and "a new water ethic", and discuss briefly how the interpretations of the IWRM can be understood in light of this. The chapter is divided into four main sections. Section 4.1 deals with "water as an economic good", section 4.2 with "participation", section 4.3 with "a new water ethic", and section 4.4 sums up the findings of the chapter.

4.1 Water as an Economic Good

The fourth Dublin Principle presents the idea that if water is recognised as an economic good, one avoids wasting it. In the past, "failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource" (see the Dublin Statement on page 43). If water is recognised as an economic good it provides "an important way of achieving efficient and equitable use" as well as helping towards protecting and conserving of the resource. According to Savenije and Van der Zaag, recognising water as an economic good has been widely accepted (2002: 98), but what does it mean to do so?

4.1.1 Two Schools

There are two quite different ways of interpreting the element "recognising water as an economic good"; one is a narrower, concrete understanding, the other a broader, more abstract understanding. Savenije and Van der Zaag (2002: 98) explain these different interpretations as two different schools of thought on the subject. These two schools bring with them very different implications for how IWRM is to be applied in a given context, e.g. Yemen. The first school of thought focuses on pricing water, and then letting the market do the rest of the

work, the second school focuses on the process of allocating scarce resources based on the advantages and disadvantages, but not necessarily through financial transactions.

John Briscoe who worked for the World Bank to help articulate their strategy for water management (Bauer 2004: 17) claims that the value of the water can be determined by "the maximum amount the user would be willing to pay for the use of the resource" (Briscoe 1996). In contrast, the second school focuses on seeing the resource in a "broad societal context" according to Savenije and Van der Zaag (2002: 99). They cite Gaffney's definition of economics as something which should deal with meeting "*all* human wants" (Gaffney 1997: 484; emphasis in the original). Instead of focusing simply on what increases GNP when allocating water, one needs to take into account a wide range of things such as recreational uses, wildlife, environmental benefits such as saltwater repulsion, public health, sustainable resource supply, to mention a few (Gaffney 1997: 483-484). So in the second school of thought, when deciding what the use of water should be, this cannot be done by simply pricing the water (Savenije & Van der Zaag 2002: 99).

One can say that the question at heart of both the schools of thought seems to be determining the value of water and using it for the highest value purpose, but that the way of determining this value is different. Bauer (2004: 11) notes a somewhat similar division into two schools of thought when he says that the fourth Dublin Principle can be interpreted in a "narrow" or in a "broad" economic perspective. The narrow being an economic perspective which focuses mostly on "formal, quantitative, and technical approaches to neoclassical economics," and the broad perspective taking the analysis of various other disciplines into account concerning politics, history, institutions and the environment (Bauer 2004: 11). A third option is what he calls an intermediate position which acknowledges that there is not enough water for all uses and that one has to make choices about where to allocate it, however not necessarily through a market (Bauer 2004: 10). In the following I will present and discuss the two schools of thought's take on the price, cost, and value of water, as well as water markets and property rights and also how they relate to IWRM.

4.1.1.1 Price, Cost and Value

In order to know the price, one has to know the cost and according to Briscoe there are two types of cost within water management; both of which should be reflected in the price of

water (Briscoe 1996). There is the cost of physically providing the water (building pipes, purifying water etc.) which Briscoe calls the "use cost," and then there is the "opportunity cost" which refers to the "cost" of not employing the water for an alternative use because you are already using it for something else (Briscoe 1996). A very simplified example of this: imagine two farmers, farmer A and farmer B, sharing a water resource but growing different things. Farmer A grows bananas at $10/kg, while farmer B grows sorghum at $1/kg. They share the water resource 50-50. In this very simplified case, all else being equal, the opportunity cost of growing 1kg sorghum is $10. The idea being that farmer B is wasting water on sorghum and forgoing the chance of making $10 from bananas.

When determining the cost of water the second school is more inclusive than the first. Savenije and Van der Zaag (2002) use a model showing how one can break down the different types of cost, and point out that the first school has trouble dealing with all of these. According to Briscoe (1996) there is the cost of supplying the actual water to the user; this includes the operation and maintenance as well as the initial investment need; what Briscoe would call "use cost". Then there is the "full economic cost" which includes the opportunity cost (what is "lost" by not using the water for the second best alternative), as well as the economic externalities. Savenije and Van der Zaag (2002) add another term: "full cost" which includes all of the above as well as environmental externalities. This is separated from other externalities because it is hard to quantify in monetary terms as it involves long-term effects on sustainability (Savenije & Van der Zaag 2002: 100-101). While the first school of thought, as explained by Briscoe (1996), does not ignore the environmental externalities by definition, it seems the only way for them to be accounted for is if someone is willing to pay for water needed by the environment.

Savenije and Van der Zaag allow for water pricing, but only as a way to finance of water delivery, but not of determining where to allocate water (2002: 101). On the contrary, if one considers a certain use of water as beneficial, one can allocate the water to this without basing the decision on the price of water; after all as the authors point out, one considers a police force a good idea, and therefore it is paid for by society as a whole (Savenije & Van der Zaag 2002: 101). Likewise, one could imagine food self-sufficiency or a rural landscape being

valued enough for water prices within agriculture to reflect this and not what water is worth to the individual farmer.

In the opinion of the authors, the very nature of water makes it unsuitable to deal with as one would any other commodity. While economists of the first school maintain that water pricing is the best way to curb demand and also to move water "from sectors with lower added value to sectors with a higher added value" (Savenije & Van der Zaag 2002: 102) they disagree as the qualities of water make it a special recourse.

According to the authors, because people have an essential need for water domestically introducing a high price on it will not make them use less of this water. When it comes to water used for non-essential purposes (watering a garden or washing a car) the people who use this water will often be able to pay far more than those only using water for essential needs, which means that increasing the price does not necessarily decrease the demand. Instead the authors suggest a block tariff system where the price increases with the increased use of water. They also argue that water should be governed publicly as opposed to privately where there might be little incentive to keep prices affordable or water demand down (Savenije & Van der Zaag 2002: 102).

Secondly, with regards to value, Savenije and Van der Zaag point out that the value of agriculture is often measured by the price of agricultural produce, but that this is misleading as it does not take into account all the other industries which depend on the agricultural production. Furthermore, the opportunity cost of water is not necessarily as high as it becomes when compared to the value of domestic water use. This is because while one needs a certain amount of water no matter what the cost, one does not need large amounts in the same way Therefore, the idea that that the agricultural sector has a much lower value than the urban sector is exaggerated and in most cases there will usually be enough water for the highest value uses as well as agricultural uses (Savenije & Van der Zaag 2002: 102-103).

Additionally, there is the value of the water that returns back to the catchment after it is withdrawn and can be used again. There are indirect benefits from the water e.g. by using water for agricultural production you are both ensuring employment in that sector as well as food security. Another value easily overlooked by the first school of thought because of the

difficulty to measure it in monetary terms is the broader value to society for example in terms of cultural or aesthetical values (Savenije & Van der Zaag 2002: 101).

Movik (2002: 256) argues for an "administrative allocation of water rather than a market-based one" and explains why the calculated cost of water for agriculture is often wrong, and also why even if the right cost was applied it could be bad. As irrigation water has many uses (other than watering crops e.g. fish, livestock, gardens, and groundwater replenishment) the true value of water for irrigation is often higher than what a calculation based on agricultural output would show (2002: 253). Furthermore, what is considered "inefficient water use", could be water that is returned to the basin and is used again by someone else. If one tries to increase efficiency in irrigation for example, it could mean that more water is used in the entire basin, not less (2002: 255). However, even if one did include all this in calculations and still found that agriculture was not the "best" place to use water in terms of value Movik maintains one should be careful with pricing water to move it to what is considered higher value uses than irrigated agriculture. This is because the sector provides not only jobs but also food, especially for the poor (2002: 254). Furthermore when there is very little water, even if prices increase sharply, it is limited what a farmer can do to change production and water consumption (Movik 2002: 255).

4.1.1.2 Water Markets

Belonging to the first school of thought, Briscoe (1996) explains the current water resource problems as a lack of water markets. Instead of a market the water is being divided on the basis of who has historically been using it (for example, your family's farm has always drawn water from a certain water source) as well as water being allocated on political grounds. When this happens, the only answer to water scarcity will be to increase the supply at the cost of the resource. In a canal irrigation system a water market system is "far superior in terms of overall productive efficiency" (Briscoe 1996) because here all users can bid and water goes to the highest bidder, instead of as in a system of timeshares or of turns where each farmer takes what they need in the order of their location and then pass it on to the next farmer.

Briscoe admits that one might need "effective basin-level management which will both complement and enhance the workings of the water markets" (1996). How far Briscoe thinks this enhancement or addition can go before it disrupts the market, is however hard to say.

Savenije and Van der Zaag (2002: 99) on the other hand, claim that if you recognize the spatial and temporal connectedness of water, and the fact that everyone needs water and there is no alternative to it, one also has to admit that it cannot be dealt with as any other resource. Other resources such as energy give the consumer a wide option to choose from and then the market mechanisms work. But with water there is no other alternative, any type of use will affect the resource as a whole (Savenije & Van der Zaag 2002: 99).

4.1.2 A mix between school one and school two

Perry et al. (1997) offer an alternative way of tackling the problem of "recognising water as an economic good." Quite similar to the block tariff system mentioned earlier and perhaps a mix between the two schools, they look at the different *uses* of water and then decide which uses should be regulated by the market.

They insist that the question lies not in deciding whether water is an economic good or not, because it is by its very definition (i.e. something that can be used for many different purposes and cannot satisfy all these purposes at the same time). Instead the question is whether it should be dealt with as a private good or a public good, and the answer to this they argue, depends on the use of the water (Perry et al. 1997: 2). They make a division between different types of water depending on what needs they satisfy, which in turn depends on how much water is available to a user. For example, if you only have a very limited amount of water then this goes to your basic needs but if there is more water than what is used for basic needs, this can then be used for agriculture, lakes, swimming pools etc. They claim that a humane society needs to ensure that minimum needs are covered, that water ceases to be an economic good when people have to have it to save their lives. However, although they argue society should not let the market distribute water at the cost of the weakest, as long as "the margin of basic need has been satisfied" society need not interfere beyond this (Perry et al. 1997: 6).

Regarding agriculture, Perry et al. (1997: 8) for example see the benefits of volumetric pricing as "obvious" as long as the price includes both what Briscoe (1996) named "use cost" as well as opportunity cost, but they also see the problems within agriculture. Volumetric pricing can be problematic within existing irrigation systems where the agricultural land has little value without water. A farmer who has then spent large sums on a lot of land might be left with his

land worth far less all of a sudden if he has to pay a new price for the water he is using (Perry et al. 1997: 9).

While seen as promising by Perry et al., the authors note that water markets might fail due to either externalities, transaction costs, or property rights (1997: 10). Regarding externalities, most important in the case of irrigation is that water taken from a river or an aquifer is not only used by that one person. Some of the water for example will be taken directly out of the basin because it evaporates. However a lot of the water will be available for other users as well, by percolating into the ground or running into the river again. Perry et al. therefore call for a distinction between water diverted and water consumed (1997: 10).

On the other hand, the fact that water is returned to the basin is not necessarily a benefit. Perry et al. (1997) explain that returned water might only be available in theory but not in practice, because of a change in water quality (more salt in the water as plants will have taken only the water, or more pollutants from fertilizers) or availability (the water is returned where no-one can use it or at a time where no one can use it) (1997: 11). The point for Perry et al. (1997) here is that it is very hard, although important to calculate the externalities of water use in a basin into the price of the water, and therefore you might not get the behaviour you wanted. For example, in response to high water prices a farmer might decrease water use by switching crops to something that requires less water, but perhaps allows more water to evaporate – thus leaving the downstream neighbour no better off. Or if one prices the water consumed, but does not take into account that the water diverted will be returned at a poorer quality. Less water is taken out but the downstream neighbour might have been benefiting from soil moisture before and now has to increase his watering.

Transaction costs on the other hand, complicates recognising water as an economic good, because setting up the infrastructure for water trade and measuring use can sometimes be more expensive than what it saves in reduced water consumption (Perry et al. 1997: 11). However, even if the cost of measuring is counterproductive economically, one could argue it was worth it under the goal of protecting the water resource.

4.1.3 Water Rights

Thirdly, Perry et al. (1997) argue, you cannot have effective water pricing and water markets unless you have secure property rights on the water. This is a huge problem within irrigation,

where in many cases those upstream take more than they are entitled to. This can then become even worse for those downstream in cases where one tries to respect the prior appropriation principle, mentioned above by Briscoe (1996) and so those who have taken more than their fair share now become entitled to it through the act of using that water (Perry et al. 1997: 12). Perry et al. are therefore sceptical to privatization as a solution in developing countries where there is a lack of water rights (1997: 12). These rights then, often formalized as water permits (van Koppen 2007), deserve some special attention.

According to Movik (2002: 256) rights are crucial in water allocation, and permits are have often been perceived as "a standard ingredient" of IWRM (van Koppen 2007: 47). One way of seeing how important water permits have become is the fact that "virtually all water law reforms of the past few decades have introduced or strengthened [permits]" (van Koppen 2007: 47) In addition to providing permits, these laws often increase the state's control over water supplies by e.g. defining groundwater as public water, and also increasing the areas/uses which need a state issued permit (van Koppen 2007: 47).

"Permits are the legally binding contracts between the State and the individual or organized water users" (van Koppen 2007: 47). At its most complete, a permit is a document which states how much water is to be withdrawn, from which source and where specifically it is to be taken from, for what and where it is to be used, what types of hydraulic structures are being used, as well as drainage and treatment, and the permits usually specify a time for when they are valid (van Koppen 2007: 47). Van Koppen argues that when permit systems meet systems of community-based water law this can be a difficult and problematic meeting, because the right given with a permit can replace some previous right that existed (van Koppen 2007: 46). She explains that because IWRM tries to incorporate all users and uses on a large scale it is increasing the problem of dispossession of the water of a community through the issuing of new permits (van Koppen 2007: 48). Through history, water laws were not primarily about making water available to all, but about replacing "prior claims and customary arrangements" (van Koppen 2007: 52) so that someone arriving for example in a newly conquered territory could then have the formal and "correct" ownership of the water. As van Koppen (2007: 52) also explains, this would force those with the customary rights to recognize the new system by applying for permits themselves – if they indeed were allowed

to do so. Other places, such as Tanganyika the permit system (through which one could register a right) was once by definition only accessible to whites. In South Africa where the water belonged to those on the land which at first sight might sound more including of customary rights, the land was almost completely under the control of the colonizers – again depriving any customary water users (van Koppen 2007: 54).

Permits can be problematic in settings where they are easy to get for the ones who have knowledge of the system and contacts (van Koppen 2007: 49). First, there is the problem of reaching people in countries where not everyone is in close contact with the state. Second, the water users who have perhaps had claims to a certain resource through centuries now have to present some kind of proof which can be translated into a water permit. Furthermore, it might be costly to register—both in terms of just doing the whole thing and also paying the fee—in addition to the time allotted for registration being short and leaving people behind. So while the idea might be that a permit system ensure equality , this is hardly ever the case (2007: 56-57). Chile is an example where poor administration meant that once one could register for water rights, only a few knew about it and were able to grab rights from those who did not know one should be registering (van Koppen 2007: 60). And even if the state does its best to inform about the system and how to partake, it could be that the information channels simply are not sufficient, or that the difference between people who speak "the language of the powerful" creates an unfair result (van Koppen 2007: 60).

Van Koppen claims that issuing water permits can lead to several types of discrimination. First there is the fact that one is saying that a formal permit system is the "real" system that the customary system must fall into. It is also a problem that one might be turning a communal right into an individual saleable right (van Koppen 2007: 59). Another type of discrimination is that the small water users still have to go through all the costs of the registration (paying for the permit, getting a lawyer, finding a document, traveling to show it etc.), while what they get in return is very little. And even in the cases where one considers domestic use and small-scale use being exempt from the need to obtain a permit, but this again means that they have no formal right to that water either (van Koppen 2007: 56).

Van Koppen's point is to a large degree that one must question how permits are related to property claims and that while you can use permits to impose obligations you should also

remove the "rights" aspect connected to it so that they "are not pursued as an easy way of claiming rights to more water" (van Koppen 2007: 62).

Returning to the two schools of thought, while Perry et al. (1997) themselves see the divide as something other than a divide between two schools, they could arguably be seen as a combination of the two. They agree there is a divide between, those on the one side, who think water use should be regulated by willingness to pay, while on the other side there are those who worry that this would exclude the poor, and that water "for certain purposes at well below market prices will serve the greater benefit of society as a whole" (Perry et al. 1997: 2). However, according to Perry et al. these two flanks, which could also be seen as types one and two respectively, are not necessarily in opposition as long as there is some provision to secure such basic needs.

4.1.4 "Doing" school two

However, while the first school is full of practical advice on how to recognise "water as an economic good" (for example, determine value on what people are willing to pay, determine cost based on "use cost" and "opportunity cost") the second school first and foremost tells us *what* recognising "water as an economic good" means, not exactly *how* to do it. So while they say that the point is to choose correctly in terms of what are "the most advantageous and sustainable uses of water in a broad societal context" (Savenije & Van der Zaag 2002: 99) they do not tell us how one knows what these uses are. It is only after these uses have been established that the authors offer some practical advice on how to carry out the water allocation; namely through demand management (Savenije & Van der Zaag 2002: 100). Demand management is about influencing demand in order to "achieve efficient and sustainable use of a scarce resource" (Savenije & Van der Zaag 2002: 99-100) but beyond this it should also "promote equity and environmental integrity" (Savenije & Van der Zaag 2002: 100). So instead of pricing, which they call "the pitfall of the concept 'water as an economic good'" (2002: 99), Savenije and Van der Zaag see "demand management" as the solution. The question still remains, how one is to know what the "desirable use" of water is.

In order to carry out demand management one needs the institutions and policies which allow for an approach where one can create economic and legal incentives to influence the use of water the way one wishes. Their examples of demand management tools are quotas, licences,

tradable water rights, user charges, subsidies and other economic instruments, and penalties. Quotas mean regulating how much a certain user can take of the resource. Licences imply that water abstraction is controllable and are limited to a certain period of time. Tradable water rights means creating "… a water market where stakeholders can buy and sell water rights within a well-defined legal framework" (Savenije & Van der Zaag 2002: 100). User charges are about more than just cost recovery. They can be used to promote a certain type of water use, by either increasing or lowering the charge. In addition to this one can use other economic incentives such as subsidies, grants, soft loans, product charges, tax differentiation, and tax allowances to promote the wanted kind of water use. Lastly penalties imply both the financial and legal enforcement of the other tools (Savenije & Van der Zaag 2002: 100). Another important aspect or tool of demand management is knowledge; one must ensure people are aware of issues, educated on them, and trained to deal with them (Savenije & Van der Zaag 2002: 100).

4.1.5 "Water as an economic good" according to IWRM

How can we understand this element in relation to the theoretical perspectives explained above? To begin with, the fourth principle sounds like it belongs to the first school of thought, focusing on pricing water first and foremost. The main text of the principle could be interpreted in either school. However the first sentence in the explanatory text: "Within this principle, it is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price" (see Dublin Statement page 45, Principle No. 4)

One can perhaps ask whether the fourth principle can be interpreted in the second school of thought, if they felt the need to add the disclaimers. Or is it perhaps a question of getting across the message that it is not to be understood within the first "neo-classical" (Savenije & Van der Zaag 2002: 99) interpretation? The way Savenije and Van der Zaag explain it (2002: 99) the disclaimers were added to appease those who misunderstood the fourth principle and thought of it within the framework of the first school.

According to Savenije and Van der Zaag the fourth principle being subject to some confusion now because at the time of writing it people were worried what water as an economic good might mean (2002: 99), Perry et al. say that the fourth principle was a compromise between

two parties. On the one side, led by economists, one wanted water to count as other private goods "subject to allocation through competitive market pricing", and on the other side one saw water as "a basic human need that should be largely exempted from competitive market pricing and allocation" (1997: 1). Bauer (2004: 10) claims the Dublin Principles are trying to "have it both ways" by saying both that it should be recognized as economic good, and then that everybody has a right to it.

It could also be argued that the fourth Dublin Principle places the use of water for drinking and sanitation as something separate. Not unlike what we saw Perry et al. (1997) do (first there is the water for basic needs which is a right, however when these needs are satisfied we can start to talk about for example using prices and water markets to allocate water). The principle may seem to go even a bit further as the right to water is something that must be recognized *within* the principle. So, it could have been a principle about the right to water for all humans and within this one wants to avoid any waste, but instead it is the other way around.

On the other hand, the rest of the explanatory text seems closer to the second school of thought. It is because we have not recognized the economic value of water that we have used it in a way which is "environmentally damaging" (see Dublin Statement page 45, Principle No. 4). In other words, by recognizing water as an economic good, one can protect the environment. For this to be true, the water used for the environment has to have a relatively high value. As has been pointed out by several of the authors, the benefits of the environment is hard to calculate in monetary terms and therefore one can say we seem to be looking at a school two approach where one tries to see "economic value" as something benefitting society more generally. Furthermore, the explanatory text goes on to say that "managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources." While the mention of equitable use might immediately sound like a broader benefit, Briscoe (1996) of the first school also claims that when water is treated like an economic good and allocated through a market it will lead to more equitable use. However, we remember that Briscoe's main way of allocating water is through pricing, so it is questionable that this would lead to "conservation"

of water resources. Just because one is not "wasting" it in terms of the first school, does not mean one is conserving it.

When considering the theoretical perspectives on what "recognising water as an economic good" means, it is difficult to conclusively place principle four in either of the two schools. The overall focus of the Dublin Statement on the importance of water and on society's role perhaps places it more in a school two perspective; however it could also easily fit in with the first school. In my matrix of IWRM elements I have placed it as a tool categorizing it as the more practical approach of school one, or the equivalent of demand management in school two.

4.2 Participation

Managing natural resources by involving the local community and ensuring their participation has become a popular approach (Bruns 2007: 30), and in the Dublin Statement participation also has a central place. Both the second and the third principle refer to the involvement of people; "users" and "women" respectively. Whether a participatory approach is successful or not depends of course on how one defines the goals of participation in the first place. I will here explain some of the different ways of interpreting participations and see where IWRM fits in. Then I will present Kemper et al.'s (2007) framework for investigating what is needed to have decentralized water resource management and what the outcomes of such management are; adding my own comments in relation to IWRM and explaining how decentralization relates to the more general concept "participation".

4.2.1 Typologies of Participation

One definition of participation is that of Mark S. Reed who defines it as "a process where individuals, groups and organisations choose to take an active role in making decisions that affect them" (Reed 2008: 2418). When evaluating a participatory process there are several things one can measure its success by. Reed (2008) presents different "typologies of participation" which are all different ways of understanding or evaluating participation. For example, it could be the way people participated, the reason for the participation, or the aim of the participation.

For example, one can evaluate participation in terms of empowerment. Here the question is whether the participants actually have control over a project, or if they are merely being consulted (Reed 2008: 2419). Although this division appears normative, some scholars prefer to see them as mutually beneficial, just appropriate in different cases, according to Reed. Empowerment can also be seen as an overarching approach to water management, as opposed to a way of doing one small part of water management, namely participation. Boelens et al. (2005) see empowerment as a "school of irrigation," which focuses on participatory approaches and is concerned with equity, democracy, and social justice (Boelens et al. 2005: 8-12). However, equity, democracy, and social justice are not the only goals that matter; there is the belief that the people concerned in water management will actually make the best decisions themselves. In their opinion, if one observes for example poor irrigation management performance, it is because one has not included the people affected by this management in the decision-making (Boelens et al. 2005: 12). Although, even if one agrees with the premise that people make the best decisions for themselves, there is also the questions of having enough information and of making good long term decisions (Boelens et al. 2005: 12). Another typology focuses on information exchange. While sharing information with participants is considered "communication", and gathering information from participants is considered "consultation"; "participation" is only when the information flows both ways (Reed 2008: 2419). Power and control are central issues in this type of irrigation thought and so for example a successful water user association (WUA) is not defined by how they influence irrigation management, but also how they increase the power of farmers, and help them negotiate amongst themselves as well as with others (Boelens et al. 2005: 12). A problem with participation is that wherever one introduces participation there is not a power vacuum and one might create negative consequences by "disturbing" the power, or one might reinforce already existing power relations, making it more difficult for those in a weaker position. Another limitation might be existing veto-powers or non-negotiable positions which cannot be influenced by the decisions made through a participatory process (Reed 2008: 2420-2421).

Another way of seeing participation is that it is either normative or pragmatic. Here the point is the thought behind the participation. Is one trying to get something done and using participation as a way of achieving that goal; for example, locals disclosing information

which would take an outsider ages to collect herself, or would have been impossible to obtain. The idea being that the people involved will be better off as a result of participation, not because participation is a goal in itself, simply because it helped achieve a better result in this instance. The opposite, the normative take on participation, sees it as a right and an end in itself. So participation might not be necessary in order to for example get information, but it is necessary component of a successful project (Reed 2008: 2419). Reed says that the typologies can be used as a sort of menu to choose the best participatory methods, or as a way to categorise participation which has already happened (Reed 2008: 2419).

In Chambers (1995) we find that "participation" can be used in three different ways. The first is as a "cosmetic label" where e.g. donor agencies claim to be using participatory approaches, but in fact are doing everything top-down (Chambers 1995: 30). The second use of "participation" describes what Chambers calls a "co-opting practice" (1995: 30) where local communities and people take part in a project which is not theirs. So while they spend time and resources this is done primarily to reduce the cost of the project which is not under their control. The third use describes a process where the local people are empowered, and are the ones doing the analysis and "owning" the project as apart from being participants in somebody else's project (Chambers 1995: 30). Viewed in terms of the different typologies, we can say that Chambers uses a mix of typologies, making the divide between empowerment and co-optation and explaining co-optation as a pragmatic approach.

4.2.2 Limits and Drawbacks with Participation

While involving the local community in managing natural resources can be advantageous, it is not to be overlooked that politics and history can make participation difficult or impossible (Bruns 2007: 29). One problem is that in pursuing IWRM one can end up ostracising the local community because one creates a single forum for deciding water allocation and also assumes that there is one, common interest (Bruns 2007: 41). Imagining a local community as one, homogenous group with both a collective interest as well as traditional value for the protection of natural resources, means overlooking what is often a far more complex reality. One might easily romanticise a community as a cohesive structure full of agreeing individuals where one can make adjustments in order to optimize natural resource use. However, in a more complex community, water user associations might simply not be able to make big changes. Managing water resources means taking part in the struggle between potential users,

and therefore asking people to partake in deciding for example water allocation, conflict may arise as people are interested in receiving what they see as fair. Wealth, age, gender and positioning along the water source will affect people's interests, and hence the success of any collective action (Bruns 2007: 31). However, collective action implies that everyone is involved; but participation need not necessarily mean that.

Reed sees the claimed benefits of participation as divisible into two categories: normative and pragmatic benefits. The pragmatic being what yields the best result in terms of environmental decisions – their "quality and durability," while the normative benefits focus on society (Reed 2008: 2420). From the pragmatic perspective, participation can lead to better research and decisions because more information becomes available. It can also lead to solutions which are better adapted to local situations and which fit needs better, or it can help turn conflict into cooperation and insure support and implementation of a project when those involved feel ownership over a decision – a feeling they might get from participating. In addition to this it can also reduce implementation costs (Reed 2008: 2420). On the normative side, the benefits are that those on the edge of society or the usual decision-making process may be included; participation might increase people's trust – not just in the specific case where they participated but in generally to decisions being made. When people participate, they can become empowered by the knowledge that is produced through participation in a larger context, and also promote social learning between stakeholders. Participation can be sensitive to large ranges of values and needs emerging from the "human-environmental interactions" (Reed 2008: 2420) and this can in turn "increase the likelihood that environmental decisions are perceived to be holistic and fair" (Reed 2008: 2420). This last point however, seems to be a pragmatic rather than normative benefit. Bruns (2007: 32) also points out that what the local incentives make a big difference for participation. Both in terms of incentives to participate (it might be thought costly, seem hopeless an unnecessary) and also in terms of the results: Local control does not automatically equal sustainability, equality and environmental conservation (Bruns 2007: 32). Here it depends what you want to do with your participation, whether you take a normative or pragmatic approach.

Participation might not improve the situation for everyone in a community, but this need not be the goal by definition. According to Bruns (2007: 31-32) one can try to make a difference

by a special focus on those who are the poorest, he explains that in a community with inequalities it is very unlikely that community-based approaches will increase equality. No matter what one does, local elites will usually be in control and community- based approaches might reproduce the inequalities of a community, or worsen them. However, neither Reed's nor Bruns' definition of participation demands the inclusion of *all* users or stakeholders. Bruns' explains participation as "a general term for a variety of institutional arrangements that involve stakeholders in decisions" (2007: 30). The term "community-based" on the other hand, is used to describe granting of primary decision-making power either to a community through "either local governments or specialized organizations of resource users such as water user associations" (Bruns 2007: 30). Instead, participation seems to happen within a relationship. For example the relationship of the state to a community can be participatory, but that does not mean that the relationship between the individuals in the community is participatory. Of course one could argue that participation has to be participatory "all the way" in order for it to count. However, none of the typologies specify this. They all seem to think of participation as something that happens from the outside, to the inside of the local community. The Dublin Principles for example, mention "involvement of users" but not necessarily of *all* users.

The above gives some insight into how one might evaluate a participatory process; the question remains, how does one investigate whether participation might work in the first place? Karin Kemper, William Blomquist and Ariel Dinar have created a framework for investigating participation, consisting of various factors which affect its possibilities of existing and its effects.

4.2.3 Factors affecting decentralised water management

Kemper et al. focus is managing a river basin at the lowest appropriate level which they see as the second Dublin Principle (Kemper et al. 2007a: 3). They want to investigate "whether river basin management at the lowest appropriate level really works and what the outcomes are when it is applied" (Kemper et al. 2007a: 3).

Kemper et al. (2007) it seems, do not see participation or decentralization of decision-making in the sense of "empowering". They state that it is not an aim in itself, but rather a means to improve water management by taking local conditions into account and keeping decision

makers accountable (Dinar et al. 2007: 34). According to Reed's typologies this places them on a pragmatic rather than normative side, although they also pay some attention to issues of empowerment (see Blomquist et al. 2007: 27). Therefore, when later investigating the specific case in Yemen, we must keep in mind that participation which fails in the eyes of Kemper et al. because it does not improve basin management can have some benefits from a normative perspective.

4.2.4 Resources

Some of the factors Kemper et al. (2007) identify, have to do with the situation at the local place of participation, others have to do more with the situation at a national level, and yet others are mostly based on the interaction between the two.

At a local level, resources play an important role. First of all, decentralization processes need to be financed and if money can be generated at a local level (for example by collecting water tariffs) the process stands a better chance. Relative access to resources is also important, as big differences affect people's wish to participate, either because they are unable to contribute, or because those who are relatively better off do not want to support a process which might leave them worse off in the end (Dinar et al. 2007: 35-36). However, if someone has far more resources than everyone else, is it necessarily said that he will be worse off through decentralization? If the question is whether the village decides annual water use, as opposed to the government, is it then implied that there will be equity between the villagers? So here Kemper et al. (2007) also seem to take participation to mean all users at an equal footing. Furthermore, the larger the differences are between people in the basin, whether economically, politically, and socially, the more different and unequal their political influence will be, and the more difficulty one will have creating and maintaining institutions for water management, because people will have different amounts of political influence. Because people have different political influence based on factors such as wealth, religion, "or other social and cultural distinctions" (Dinar et al. 2007: 38) this will also affect how stakeholders communicate, their trust for each other and wish to cooperate. Successful implementation of decentralization initiatives is affected by the degree to which the local participants are used to "governing and managing other resources or public services" (Dinar et al. 2007: 38).

At a local level, the existence of basin-level institutions is a prerequisite for successful implementation of decentralization initiatives, as these initiatives are all about people participating, and those people have to have the "infrastructure" through which they can participate. Another factor is sub-basin organizations which are able to communicate localized needs and issues within the basin. These help the success of the decentralization, however if there are too many sub-basin organizations it is likely that the decentralization will not be successful because transaction costs become too high (Dinar et al. 2007: 39).

The ability to share information and to resolve conflicts is also important at the local level. The more information that can be shared, the more it will help cooperation and help towards a successful decentralized management of water resources. Because conflicts will arise over who should get what, or do what, or decide what; one needs to have mechanisms to solve such conflicts (Dinar et al. 2007: 40).

Decentralization initiatives stand a better chance (of being accepted, and of lasting) if they base themselves on the locally existing governance institutions and practices. This is both because it lowers transaction costs, but also it enhances acceptance and commitment (Dinar et al. 2007: 36-37). Therefore the degree, to which local communities are able to create their own institutions for managing water, makes it easier to implement and sustain decentralisation initiatives (Dinar et al. 2007: 38).

At a national level, resources will also affect participation. The nation's level of economic development determines to what extent they can finance a decentralization process. According to Dinar et al. the nations where the government is able to bear the cost of the process in addition to some cost perhaps as it continues, have a greater chance of being successful.

4.2.4.1 Commitment

While a decentralisation process can be top-down, bottom-up, or desired by both sides, because it requires the active involvement of stakeholders, implementing decentralisation is more likely to succeed when it is a process desired by both sides (Dinar et al. 2007: 36). The government's commitment is important as we saw in terms of resources, and this support needs to be consistent over time for successful decentralisation (Kemper et al. 2007: 1). At a local level the participation of people was affected positively by a large diversity of groups of

stakeholders represented, who could interact often over "an ambitious agenda of basin management" which were directly relevant to people's livelihoods and local communities one saw active involvement (Blomquist et al. 2007: 22-23).

Whether one managed to established river basin organizations depended on how committed the government was. In the places where there was commitment from the government for creating stakeholder organizations it was easier to get these started (Blomquist et al. 2007: 23). That was also the case if there was either "the presence or the prospect of valuable infrastructure investments" (Blomquist et al. 2007: 23), these would of course depend on the resources available to the country as well.

The success of the decentralization process at a local level was affected by what Blomquist et al. called "the presence of a champion" (2007: 23). What they meant by this was a person who pointed out problems in the basin and pushed for change. In addition to this there was the question of whether there were important problems to deal with in the first place. Where there were severe water resources problems, people tended to be "forced" to organize. (Blomquist et al. 2007: 23). The ability to which this organization to succeed locally is in turn affected by existing water rights system at a national or regional level (Kemper et al. 2007: 12).

One thing is getting the active involvement of stakeholders in the first place, but once you have it, how do you sustain it? What mattered here was whether basin organizations were making a difference in matters important to the people. Whether they had government support and managed to operate on a frequent and regular basin? If yes, this helped sustain the stakeholders' active involvement over time. In places where government support came and went for example, stakeholder involvement went down (Blomquist et al. 2007: 23-26). While the degree of their support to stakeholder involvement, water policy reform and basin management also was important, the consistency seemed to be as important. Another factor which helped sustain the decentralized arrangements was to what extent they were bottom-up initiated. This helped especially in places where there was experience with local autonomy, and it also helped if there was little cultural conflict among stakeholders, sub basin communities were recognized and local institutions were incorporated (Blomquist et al. 2007: 31-32). However, the idea of recognizing sub basin communities and incorporating existing local institutions might be at odds with each other.

So when you have the stakeholders involved, does this in fact lead to more effective resource management? Blomquist et al. found that while increased involvement did produce a lot of good result as better flood protection, protection of the environment and the water source in terms of discharge, it could also mean that one could not get rid of unhealthy practices, their example being single groups that because of their political leverage exempted themselves from paying what other uses had to (Blomquist et al. 2007: 27-29).

4.2.5 Participation according to IWRM

How can we understand "participation" according to IWRM? Using the four typologies explained above as a starting point we find for example that there are elements of informing and learning, or "consultation and communication". The Dublin Statement's second principle (see page 45) states that "Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels". There are elements of both communication (the explanatory text of the principle calls for "raising awareness") and it also calls for "full public consultation".

The third principle focuses first and foremost on the *recognition* of women's role; it is the explanatory text which implies participation. It states that women's role as "providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources". This principle is clearly more normative than pragmatic. It is about accepting the role of women, and as the explanatory text states, "equip and empower women to participate at all levels in water resources programmes, including decision making and implementation." Apart from a statement that women are "guardians of the living environment" there is nothing to suggest that including women necessarily will yield better results from a pragmatic perspective. Rather, because they are "providers and users" they should be included in institutional arrangements for water management.

The second principle could be either normative or pragmatic. The statement is simply that one "should" base management and development on participation, but if this is for the sake of participation itself, or just because it yields better results within water resources management is unknown. The explanatory text of this principle states it means that "decisions are taken at the lowest appropriate level". In terms of empowerment it is hard to say what this implies; it

could both mean as much empowerment as possible, or as little as possible. How is one to know what the "appropriate" level is at any given time? If there are conflicts, which level wins the chance to make the decision? On the other hand, this is very much in line with the idea of typology one presented earlier, that different degrees of participation are suitable in different scenarios. The text also calls for "involvement of users in planning and implementation of water projects," but this could in theory mean a co-opting practice as described by Chambers (1995), with all decisions being made at a higher level. The third principle is different in terms of empowerment. It explicitly calls for empowerment of women, and also calls for the inclusion of women "in ways defined by them." As such, it is more of a one way information flow, or consultation, as defined in typology three.

Seeing the two principles together, they seem like they are conveying the same message, but one is being more specific. Principle two is about participation in general, and principle three is about women's participation specifically because they are a group that often is "left out in institutional arrangements for the development and management of water resources". If this is the case, it is reasonable to believe that the ideas of empowerment and normative approach of principle three also go for principle two, meaning that those who use and provide water should also have a say.

4.3 A New Water Ethic

The ethics presented in the Dublin Statement are closely linked to what I described earlier as a new understanding of water? One way of thinking about it, is that a water ethic is a sort of instrument that can be 'used' to achieve the desired water management (see Harremoës 2002). In fact, as Harremoës sees it, if our dealings with the environment are not based on such ethics "the long-term prospects for environmental improvements will be doubtful" (Harremoës 2002: 116). In this case, an ethical value concerning water's importance can help for example to conserve or protect it. However, this still begs the question of why water should be protected. Armstrong (2006) provides us with four alternative positions that a water ethic can be derived from. The Dublin Statement can be seen to embody elements from several of these, and also implies a water ethic as a basis for regulation similar to what Harremoës explains, although this is not stated explicitly.

4.3.1 Ethics to Regulate Water Use

Ethics have lately begun to take on an "ecological dimension" and while ethics used to concern only humans, they now concern, not only animals but also the environment (Harremoës 2002: 113,116). Therefore, such ethics, which can regulate our water use, can do so more extensively than if we only worried about fellow humans. However, when responding to problems concerning water use, the potential of ethics is frequently overlooked because while regulation often needs to happen quickly, changing ethics takes a long time (Harremoës 2002: 123).

Harremoës claims that at the moment we are in a situation where policies succeed or fail, depending on how the individual, local communities choose to behave. Not just on what rules and regulations are put in place centrally. This behaviour in turn, depends on the ethical values present. In order to change behaviour, one first has to change values, a change that can only be addressed at a specific location and from the bottom up (Harremoës 2002, 113-114).

Harremoës sees ethics as an alternative of regulating water in contrast to what he calls "command and control," and to economic regulation. In his opinion the former is problematic because it often leads to heavy regulation with numerous rules which causes people to lose respect for any measure taken (2002: 117). Economic regulation on the other hand, oversimplifies things through cost-benefit analyses. Instead he suggests a new term "*'pro et con',* which explicitly incorporates all values within the moral community" (Harremoës 2002: 117) in other words, a large-scale, broadly defined cost-benefit analysis.

While Harremoës might be right that ethics can be used as a tool for regulating water use, the question still remains whether the ethics exist in the first place, what these specific ethics are, and where they come from. According to Armstrong (2006) statements concerning water protection or sustainability often have exactly this problem that they take for granted that this is something we have to do, without explaining exactly why. These statements presume a water ethic, but often do not explain where this comes from and why it should be there (Armstrong 2006: 9).

4.3.2 Different Bases for a Water Ethic

The foundation for a water ethic can be different things; Armstrong divides them into four categories: a utilitarian position, a consequentialist position, an intrinsic position, and a

theistic position (2006: 10-11). The utilitarian position focuses on what water can do for us, and how we can use it. As Armstrong points out, this raises the question of what we mean by "us". While it can mean anything from the individual to the whole human race, according to Armstrong it does not mean water that is not used by humans, for example water at the poles or waste water that nobody uses. The utilitarian position is often combined with trying to place a monetary value on water so that it can be allocated to the best use (Armstrong 2006: 10).

The consequentialist position dictates that one should not treat water in a way which compromises others' use of the resource whether in another location or at another time. However, it is not always easy to know what the consequences are. In the future we do not know who (if anybody) will exist, which makes issues of responsibility difficult. It is also hard to be responsible to non-human beings or an inanimate nature, because you cannot communicate with them about our actions (Armstrong 2006: 10).

The intrinsic position is more different. Here nature has a value in itself, and instead of being protected *in order* for humans to use it, it is protected *because* humans use it (Armstrong 2006: 10-11). A difficulty according to Armstrong is that it is hard to determine exactly what is "natural" interaction between nature and humans, and what is exploitation (Armstrong 2006: 11).

The theistic position sees nature as created by a god to whom one ultimately is responsible for how one uses that creation. Armstrong claims that today's Christian theistic stance is close to the intrinsic position (Armstrong 2006: 11). More relevant for this thesis is Islam which is the religion of nearly all people in Yemen. According to Richard Foltz (2000) Islam can be, and is indeed seen as a possible solution to environmental problems because it dictates a stewardship of the earth. However Foltz disagrees and claims that "Some of the most severe environmental problems in the world today are found in countries where the majority of inhabitants are Muslim" and that this would not be so if Muslims were living according to an interpretation of stewardship which focused on the natural environment (2000: 68). Here Foltz is perhaps overly strict in his interpretation, as he holds the individuals accountable for a country's environmental situation. On the other hand, it could perhaps be an accurate

description if one takes on board Harremoës' claim that the actions of a small community are as important as rules and regulations.

As Armstrong points out, what is important with regarding these different positions is that conflicts about environmental management can often be between people with different ethical bases (Armstrong 2006: 11). Therefore, a conflict is not necessarily due to a disagreement in how to deal with water, but how to think about that 'dealing' in the first place. For example, a disagreement over which use water should be put to cannot be solved by measuring the benefits it might have for the environment unless both arguing parties see this as an ultimate goal. The conflict is not about the *how*-to, it is about *what*-to.

Armstrong (2006) then proceeds to develop his own water ethic based in part on Aldo Leopold's "land ethic" which he sees as an ethic within the intrinsic position. He attempts to create a system whereby actions can be divided into ethically "good" or "bad" based on the consequences they have. Not only in the narrow sense of the consequentialist position as explained earlier, but in terms of consequences beyond a purely human (needs and wishes) context. He envisions a complex weighting system where one can measure the positive or negative impacts of different dealings with water based on what, and how severe the consequences are. For example disturbing something fragile or destroying something rare is worse than disturbing something robust or destroying something easily replaceable (Armstrong 2009: 141-142). This is not unlike Harremoës' "pro et con" approach mentioned earlier.

Armstrong proposes a number of rules of thumb, which he sees as a practical way of dealing with water, the idea being that a full analysis of what is "good" and what is "bad" is too cumbersome to do in real life (Armstrong 2009: 143). Again we are reminded of Savenije and Van der Zaag's explanation of school two, except that Armstrong's rules of thumb, provide us with more information on what to do.

The rules of thumb are that as far as possible, everyone and everything should be given access to the water they need. When there is not enough water to go around, one should as far as possible try to share the water and not grant humans automatic first right as humans can rely on temporary migration and technology. One should protect unique or rare habitats and

species and attempt minimal disturbance of the natural condition of water sources, allowing also for natural water events such as flooding. Where changes are already big, this means leaving water bodies to the state which is best for the hydrological system and the ecosystem. All users should be included in decisions about water use aiming to address social injustice and secure representation of the environment as well (Armstrong 2009:143-146).

4.3.3 The Water Ethic of IWRM

The rules of thumb given by Armstrong (2009) are far more explicit than the water ethic we can sense from the Dublin Statement. Therefore we might say that while there are elements of the various positions, including an intrinsic one, there is no clear practical approach to how this ethic is to be exercised, as opposed to Armstrong who through his rules of thumb offers such an approach. This is important, because while one can find many practical points of approach in the Dublin Principles (the elements), these are not points on how to fulfil the water ethic's requirements in the same way as Armstrong's rule of thumb are. Instead they are points on doing water management which all *assume* that people share their water ethic.

The Dublin Principles seem to go beyond the utilitarian position described by Armstrong (2006), focusing on more than just humans, however, not as far as the theistic or intrinsic position. While the first principle states that water is a "vulnerable resource" (see Dublin Statement page 45) which could imply a theistic or intrinsic position, it is mainly the idea that we need water which is the driving argument. It is because water sustains life we must protect it. The explanatory text of the first principle reads: "Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems." Here it seems we are beyond the utilitarian position focusing only on humans, and instead are concerned with consequences to "life" in a broader definition. That said, they in no way seem to go as far as Armstrong whose rule of thumb placed the environment before humans in some instances.

The third Dublin Principle comes closest to an intrinsic or a theistic position when it speaks of women as "guardians of the living environment," or of avoiding "wasteful and environmentally damaging" use of water, by recognising it as an economic good. While environmental damages could also belong to a consequential line of arguing, wasting water on the other hand is not a problem in itself and therefore seems a more intrinsic or theistic point

of view. Of course in a world with increasing problems of water scarcity it is more likely than not that wasting water will actually deprive someone of it, thereby placing the principle in a consequentialist position, but it can also be a general value. The same goes for the final statement in the explanatory text which calls for water conservation and protection. This comes close to Armstrong's rules of thumb for the intrinsic position which emphasised keeping water sources in their most natural state. The same goes for the Dublin Principle on involving stakeholders, although it does not mention the environment as something that should be represented, like Armstrong did.

The Dublin Principles seem to agree at least to some extent with the first part of Harremoës argument (i.e. that it depends on what the individual communities of users do) as they also focus on the involvement of all users in IWRM. However, they offer little information on the latter part, that these ethical values may have to be addressed and do not necessarily exist already. The fact that the Dublin Statement does not mention the idea of different water ethics as basis for regulation, may be problematic as various cultures have different views on what is ethically required in a given situation regarding water (Priscoli et al. 2004: 27) and as Armstrong noted, conflict over environmental issues often arises between those who have differing ethical views (2006: 11).

4.4 Summing Up

The Dublin Principles deal with elements that are essentially very broad concepts and that can have a plethora of meanings. The first of the three chosen elements, "water as an economic good", can either be seen as the allocation of water through a market, or as a consideration of trade-offs in order to reach a higher goal. The second element, "participation", can either be about empowering a local community or a means to another end. "A water ethic" can be about protecting oneself, people in general, the environment or the water resource in itself. This chapter has done two important things. First it presents a critical presentation of the three chosen elements of IWRM "water as an economic good", "participation", and "a new water ethic". Second, it shows, in light of the theoretical views, that these elements can be interpreted in several ways and underlines that with a number of possible interpretations, it is necessary to understand what interpretation is being used, when one is assessing the

implementation or the potential for IWRM. I have argued for which of the possible interpretations in my opinion fit best with the Dublin Principles. A close examination of the Dublin Principles suggest, broadly speaking, that the element "participation" is about participation as a goal in itself; the element "a new water ethic" can be interpreted as focused on the protection of people, the environment and to some extent the resource itself; and that both presented interpretations of "water as and economic good" seem equally representative of the principles.

5 Stage II – Operationalization

In this chapter I present how my three chosen elements of IWRM—"water as an economic good", "participation", and "a new water ethic"—have been operationalized by the organisation Global Water Partnership (GWP). I will investigate how IWRM (specifically, the three chosen elements) is approached by the GWP through their online ToolBox. This will allow me to compare the GWP's interpretation of the elements as it has been conveyed from the Dublin Statement to the GWP. Mapping any changes that occur as IWRM is conveyed from one stage to another will hopefully help me explain the ultimate potential for IWRM in *Wadi Zabid*. The chapter is divided into four main sections, investigating the GWP's approach to the elements, and how it differs from the Dublin Principles. Section 5.1 presents the GWP's approach to "water as an economic good", section 5.2 presents their approach to "participation", section 5.3 presents their approach to "a new water ethic", and section 5.4 sums up the findings of the chapter.

5.1 Water as an Economic good according to GWP

Beginning with one of the elements "recognizing water as an economic good", how does the Global Water Partnership operationalize this?

5.1.1 The Value of Water

According to the GWP, "considering water as a social and economic good means designing policies to allocate resources to where they offer the greatest value to society, starting with the fulfilment of basic needs" (GWP ToolBox 2012). It is therefore important how one determines "greatest value". Fulfilling basic needs, which need not necessarily generate any economic value, is the starting point for what is considered of value to society, so it seems reasonable to interpret this within a second school of thought, explained by Savenije and Van der Zaag (2002). In other words, when we are talking of "greatest value to society" this is not the same as what people will be willing to pay the most for.

According to GWP's definition, IWRM is a process which tries to "maximise the resultant economic and social welfare" (GWP ToolBox 2012) from water management. This is to happen equitably and also sustainably in terms of "vital eco-systems" (GWP ToolBox 2012).

In other words the goal is to maximize economic and social welfare, within limits. The GWP Toolbox goes on to explain that "efficiency to make water resources go as far as possible" is a key objective that can be realized by IWRM (GWP ToolBox 2012). Precisely what is meant by "far" is not explained; is it for example over time, to as many people as possible, or for as many uses as possible? It in any case differs from allocating water based on highest value use as defined by Briscoe (1996) which in turn depends on willingness to pay for the water.

The GWP focus heavily on water being used, or integrated, into larger economic development goals (GWP ToolBox 2012), and on how water services become financially sustainable, or self-paying, and the GWP's recommendations for pollution seem to illustrate the focus on financial sustainability as the guiding principle. It states that "pollution charges are an instrument for controlling pollution" so adverse effects have to be paid for by the polluter (GWP ToolBox 2012). However, this also means that one is allowing a polluting use of water as long as one is paying for it; this would seem quite different from treating water as an economic good in terms of the second school. As the GWP states, the charge leaves the polluter with three options; to stop what he is doing, to change the way he does it, or to pay the price for what he is doing. I assume the two first options are the outcomes one would hope for, but this need not be the result. It could also be the case that when you change your operations you do it enough for the price not to be so high, but still it is polluting. The GWP explains that in theory it is unproblematic that someone continues polluting as long as he pays the actual cost of that pollution to society, although this is under the assumption that society can, and will, do something about the harm caused (GWP ToolBox 2012). The GWP claim that it is better to levy charges for pollution than to operate with a "command and control" system where you decide what is allowed and what is not (GWP ToolBox 2012). This sounds like the opposite of school two which in fact sees these decisions on what should be done and not, as the real meaning of water as an economic good.

When implementing new policies, the GWP calls for both social assessment and environmental assessment, as well as economic assessment—three spheres which could easily have conflicting concerns. The GWP calls for all three assessments, but emphasises the latter. They find that "economic assessment can provide an objective way of choosing the best water projects" (GWP ToolBox 2012) which is more than they say about the other two. For

example, environmental assessment which tries to anticipate the environmental effects of new development or changes in policy is only required in some cases. Social assessments is used to "examine impacts" on society by various projects, but it is economic assessments which is actually used to determine what to do in the first place as it helps "select the best and most appropriate projects" (GWP ToolBox 2012). Economic assessment seems to be seen as the overarching assessment of the three; it lets you know who benefits and who pays, and what external impacts there are (GWP ToolBox 2012).

The GWP states that "the sustainability of resources should be a central goal" (GWP ToolBox 2012). This would presumably exclude some uses of water that could be seen as legitimate or even desirable within the first school, for example mining groundwater for high profit. This would seem to have complications for what one can expect from a market. As the GWP points out it is very difficult to get water for environmental purposes where it has been already used for other purposes (GWP ToolBox 2012), in other words it is easier when you can protect an unused source, than when you have to move water. Therefor if a central goal is sustainability of the resource one would presumably be sceptical of a market situation where one had to rely on environmental champions.

5.1.2 Water Markets

The GWP sees markets as "a cheaper way for communities or farmers to obtain their water than the alternatives", for example getting water from a new source (GWP ToolBox 2012). It also sees markets as "cost-effective alternative for public authorities to insure against drought" (GWP ToolBox 2012). But as this could be very costly, what then for a government with very limited means? Of course the cost of large scale drought might be devastating, but could be that the government won't be the one to deal with that anyway. How does it compare to the government just saying no to use of water for non-vital purposes if it fears a drought? The same goes for environmental concerns which the GWP sees as helped by a market because "environmental champions" can buy the right to use (or in their case preserve) water (GWP ToolBox 2012). What if these champions do not exist or do not have the buying power, would perhaps a government decision based on what is considered the best be preferable? The GWP explains water markets, which it sees both as a market where prices are determined by supply and demand, but also where the public authorities buy up water to prevent drought for example, a way to deal with rights to use water which "are anchored in law or custom, and

cannot easily be revoked or amended" (GWP ToolBox 2012). However, in terms of rights, one could always imagine that a market incentive would not be strong enough to shake entrenched rights. For example, if you base your livelihood on something which has a relatively high opportunity cost, it is not certain that you would choose to give this away as it does not cost you to have it in the first place. The GWP does not promote an entirely free market though. It calls for regulation which protects third parties and the environment from any impact caused by trades in water rights, and which avoids a monopoly (GWP ToolBox 2012), and it stresses that "markets do not substitute for regulation and monitoring" (GWP ToolBox 2012). Environmental protection needs to be recognized in legislation (GWP ToolBox 2012), and considering water services, suggests that there can be some legal obligation to supply water to customers who cannot pay (GWP ToolBox 2012). The GWP sees the market as a way of doing transfers not only between low and high value uses, but also from uses which have a low social priority to a high social priority (GWP ToolBox 2012). So the GWP is not only interested in a high economic value, however it sees markets as a solution because they can identify "the highest value use" (GWP ToolBox 2012) which is a school one way of defining value – however the GWP perhaps sees this as compatible with thinking about the higher social uses, as suggested by Perry et al. (1997). The market is not the ultimate decision maker when it comes to how water should be used. For example the GWP calls for a holistic risk assessment which picks up on problems caused by water management actions (GWP ToolBox 2012). It wants environmental considerations to make it into decision-making (GWP ToolBox 2012). It also advocates environmental assessment so that one can anticipate effects of policies and developments (GWP ToolBox 2012), but does not specify if this should lead to further regulations of an entire market. What if for example a large producer of cotton through a water market buys up water—will this also be subject to environmental assessment? The GWP also advocates social assessment as something that should inform decision-making (GWP ToolBox 2012). The social assessments "should focus on the ways in which people are affected rather than on technical and economic considerations" (GWP ToolBox 2012). Although focusing on what is of greatest value to society, the GWP seems to focus largely on individual uses of water as opposed to the larger picture. For example, they acknowledge that water can be returned to the basin from irrigation, but say nothing on how this should or would affect prices (GWP ToolBox 2012).

Instead, the GWP is mainly sceptical of the low efficiency in water delivery in irrigation, and suggest improvements in conveyance (GWP ToolBox 2012). It envisions an allocation regime that exists at the top and manages water rights, and decides how much one can use of the water, and can also create markets for trading the water rights (GWP ToolBox 2012). So here we see some form of overall plan within which the market and trade can happen. These regimes "reflect social priorities and relationships with water" (GWP ToolBox 2012). Concerning water quality GWP also seems to favour regulations focusing on standards, limits, and issuing permits (T1.3.6.2), but does not explain how this fits in with its thoughts on pollution.

The GWP sees a legal framework as one of the important tools of IWRM, and one of the main functions of a water law is that it specifies rights and obligations when it comes to water use (GWP ToolBox 2012). With permits in place one has, according to the GWP, the possibility of creating markets for trading water rights (GWP ToolBox 2012). The GWP sees what they call "regulatory bodies" as very important in establishing IWRM, and these bodies among other things set prices and allocate water rights. However, the GWP also recognize that these allocation regimes have implications on human needs as well as ecosystems. They see water laws as something which can target issues of inequality by mandating provision of water for basic human needs (GWP ToolBox 2012). This would, at least, mean that the GWP agrees with Perry et al. (1997) and focuses heavily on the base line of water for people that should not be controlled by the market. Overall there is a general emphasis on plans for IWRM and focus on the national level. This rather points away from a market that controls all. In terms of groundwater they stress the importance of taking into account long term sustainability of quantity and quality (GWP ToolBox 2012).

5.1.3 The Cost of Water

The GWP has a strong focus on the cost of supplying water. As they say, even if water "starts as a Gift of God" huge sums of money are spent on supplying water to various demands (GWP ToolBox 2012). The GWP explains that water is either paid for by tariffs from the users, taxes from the taxpayers or grants from for example philanthropists (GWP ToolBox 2012.). It notes that often in irrigation water is supplied for a low tariff or for free, not covering the cost, while it does not specify what should be done, it sums up that "cost recovery in agriculture has made limited progress in many countries" (GWP ToolBox 2012).

This however is still only concerning the use-cost and so does not necessarily place GWP in one school or the other. When it comes to those too poor to afford the basic water they need, the GWP sees a solution not unlike Perry et al. (2007) where one helps supply water to these groups by using progressive tariffs or by subsidizing the poorest (GWP ToolBox 2012). The GWP focuses on increasing efficiency and productivity, and claims that these two are affected by "Institutional structures, cost recover, subsidies, and operation and maintenance systems" (G1.2.3). It stresses the need for "more crop productivity from every drop of water used for agriculture" (GWP ToolBox 2012). The GWP claims that there is an increasing need "to make efficiency gains: to do more with less water, to eliminate subsidies, incorporate externalities and minimise impacts, to recover costs of operation" (GWP ToolBox 2012). The GWP says that water tariffs "signal the economic value of water to consumers" (GWP ToolBox 2012), but it also mentions as one of the lessons learned that one has to make provisions for the poor or disadvantaged. It does however state, somewhat disconcertingly, that "Private companies are better at levying and raising charges than their public counterparts" (GWP ToolBox 2012).

The GWP sees the tariffs from water users as ideally financing both the operation and maintenance but also over time the investment. It defines "investment" very broadly not only as investment in infrastructure and for example research and monitoring, but also investment in the resource itself: investing in conservation, in development and management. This investment, the GWP points out, has to be financed, and that this can be done through charging users, or collecting aid and grants, or loans (GWP ToolBox 2012). It seems to be describing a market situation where the larger concerns for the resource have to be paid for in the same way. The GWP focuses on investment being curbed by financing can then perhaps be interpreted as the first school of thought. Of course, it makes perfect sense that an expensive treatment plant or dam needs to be paid for, but investing in the broader sense, by for example leaving an aquifer untouched for now, is another type of investment.

The GWP claims that "tariffs for water use are only effective if linked to volumetric use" (GWP ToolBox 2012). It sees prices as an effective way of improving efficiency (GWP ToolBox 2012). Later on however it says that while abstraction charges should be volumetric this is often difficult and so then one can have a fixed charge – but it does not say if it is for or

against this (GWP ToolBox 2012). The GWP sees using electricity costs as a way of controlling how much water is used, however it does not see this as ideal (GWP ToolBox 2012). The GWP says that within irrigation because metering the volumetric use is difficult "consumption proxies such as acreage, type of crop, and size of harvest" is often used instead (GWP ToolBox 2012) and one could also imagine the electricity or power supply being used the same way as a proxy, but as the GWP says it is more often used as a subsidy than as a penalty.

The GWP focuses largely on increased tariffs on water as the answer to expensive supply and operation of water as being increased payment through tariffs (GWP ToolBox 2012). Although the GWP considers tax-funded subsidies a way to direct water where one wants it, it is very sceptical of subsidies. While it admits subsidies "may serve important social purposes" they are problematic because they create dependence "lead to wasteful and inefficient use", and they can create economic burdens (GWP ToolBox 2012). As the GWP sees it: "Many times, subsidies are based on political decisions rather than considering economic and financial feasibility" (GWP ToolBox 2012). Naturally, a subsidy the state is unable to support is a problem, however just because something creates a financial burden does not necessarily have to mean that it should not be done. According to Savenije and Van der Zaag (2002), an army or police in a state is often considered valuable even if one has to pay for these services. Likewise one could think of the health system, as something which is desirable to most people even if it does not generate money and hence is a financial burden. On the other hand they are of course right when they say that it is a problem in low-income countries when big portions of the budget go towards supplying water to people (GWP ToolBox 2012). The GWP suggests that when one does have to subsidise, this should ideally only be done in the beginning, "tapering off over time" (GWP ToolBox 2012). As any costs that were originally subsidised would presumably still have to be covered, this seems to suggest that the GWP first and foremost focuses on the expense of the state and not individuals. Again, how problematic this is depends a lot on what type of individuals we are talking about.

The GWP is worried that subsidies might create a dependency which is hard to break. As they put it "Although subsidies may be introduced with the best of intentions, they are difficult to remove, and may have deleterious side-effects" (GWP ToolBox 2012). This is why the idea

that “pollution standards can be tightened” over time (GWP ToolBox 2012) seems a bit naïve. If one thinks that subsidies are problematic because they are difficult to remove, why should it be any easier to tighten standards on pollution, making the polluters pay more? However, the GWP hopes that subsidies will be able to be removed, and see the ideal subsidy as one which can be “tapered” i.e. reduced and removed over time (GWP ToolBox 2012). This does however beg the question of what is to happen with those who cannot afford water. So if the subsidy was there to protect the poor in the first place “subsidies mitigate the impacts of policy on poor and other deserving groups” (GWP ToolBox 2012)) what is the rationale behind ideally removing them over time? There is also the concern that subsidies will not be targeted enough, but will in fact serve those who do not need them also. And therefore the GWP prefers for example to use a subsidy to connect a poor household to water delivery, but not to keep the price down because that will then affect everyone (GWP ToolBox 2012). This I would say is in stark contrast to the thought of water as a human right. The GWP’s focus is on how to make the most money it seems, instead of ensuring that everyone has water. GWP seems to (not explicitly) prefer that some poor families do not get help to get enough water than the idea of helping people who do not need it. A regressive subsidy might have been another alternative, but this is not mentioned.

The GWP sees demand management as a way to reduce inefficient use of water (GWP ToolBox 2012). Wasteful use can be in terms of “an opportunity lost as well as the use of water without an economic purpose” (GWP ToolBox 2012). Here we may assume that the GWP uses the idea of a lost opportunity rather than “opportunity cost” in order to say that it is not necessarily the economic value that determines where water should be used, however the next point, that it is wasteful to use water if it does not have an economic purpose, seems to state the exact opposite, unless you take a very broad meaning of the term “economic purpose”. The GWP stresses that demand management is about tackling the problem of peoples’ attitude and behaviour towards water use (GWP ToolBox 2012). GWP imagines that most users will waste water in the belief that they have the right to do so and disregard the adverse impacts their use has on people and the environment (GWP ToolBox 2012). A way to change the demand is through education, economic incentives and subsidies (GWP ToolBox 2012) however, only the first of these three instruments might actually change how people think about water. Increasing the price of water only matters to those who do not have enough

money to pay the price easily; and subsidies probably only matter as long as they are in place. In fact you could imagine that someone who is paying a high price for water feels they have the right to waste it if they like. The real attitude changing idea here is of course education, and the GWP says that education should be directed towards those who actually are using the water (GWP ToolBox 2012). This focus on information and assessing a broad area for impacts of decisions and actions shows that GWP does not exclusively rely on the market for allocating water.

5.1.4 How the GWP's interpretation differs from the Dublin Principles

Looking at the GWP and its operationalization of IWRM, we can see that it has a slightly different understanding of water as an economic good. The GWP in fact quotes it differently. While the Dublin Principle states that "Water has an economic value in all its competing uses and should be recognized as an economic good" the GWP quotes the principle as "Water is public good and has a social and economic value in all its competing uses" (GWP 2012). Although they both see the value of water as the answer, the Dublin Principle first and foremost makes the point that water has an economic value and if this is not recognized it will lead to "wasteful and environmentally damaging" use of water. If it is managed as an economic good (and one takes into account the human right of having affordable access to clean water and sanitation) "it will lead to efficient and equitable use".

Based on the GWP ToolBox, the GWP does not seem to consider the recognition of water as an economic good as a complete overarching vision for society's best which determines how water is allocated, as the second school does according to Savenije and Van der Zaag (2002). Instead they focus more on cost recovery and the market as a way of allocating water which reminds more of school one. However they maintain that human needs and environmental concerns must be figured into the equation, and see legislation as a way of doing this. While the opening statement of the GWP that "recognizing water as an economic good" means securing the highest value for society sounds exactly as what Savenije and Van der Zaag (2002) explained as school two, the GWP seems to consider what is best for society as something which society should pay for, focusing on the users of water as the payers, not a government who decides on behalf of society as a whole. While the GWP does make some exceptions for those who cannot pay, there are still things like "conservation" which is left to

be dealt with by the market. Here one might say that the Dublin Principles take a different view of "water as an economic good" as a way to achieve an overarching goal for society. The idea that conservation of water is a type of investment which has to be paid for possibly by the "users" seems to be somewhat in contradiction that with the fourth Dublin Principle. While this principle sees "recognizing water as an economic good" as a way to ensure for example conservation, the GWP's interpretation sees conservation as one of the many uses of water which can be bought in a market.

5.2 Participation according to GWP

While the GWP focus heavily on participation, they are slightly guarded in the way they explain and promote this element. In their presentation on stakeholder participation the GWP stress that there has to be full participation of everyone and there must be both top-down and bottom-up approaches. They say that community based organisations should be involved in water management and development (GWP ToolBox 2012). Basin management plans need the involvement of relevant stakeholders and the general public for their implementation and success (GWP ToolBox 2012). The GWP states that one has to understand the local contexts and existing preferences and priorities (GWP ToolBox 2012). They emphasise information exchange (GWP ToolBox 2012) and focus on building "a shared vision" (GWP ToolBox 2012). The GWP names access to information as a key element, and points out the problems when information is only available to a few (GWP ToolBox 2012).

The GWP is at the same time sceptical to participation as it can be costly and can "postpone investment" as well as marginalise the vulnerable (GWP ToolBox 2012), and seems weary of participation because groups with limited legitimacy may take control of a participatory process (GWP ToolBox 2012). Although the GWP in general calls for both bottom-up and top-down approaches they seem to envision a system which is organised from the top. The GWP sees a potential for community based organisations but expresses caution throughout the ToolBox that one must avoid small, narrow interest groups from controlling these organisations. While they grant that community based organisations "can play an important role in developing and communicating integrated water resource management policies", they go on to say that because they are "often non-accountable and may operate from narrow self-

interest" the government should not give away its responsibility and the organisations should not be thought of as a substitutions for the government (GWP ToolBox 2012). They call for people to be organised in groups, in order to participate. These groups in turn must be part of a larger framework of organisation (GWP ToolBox 2012). The GWP talks about different size institutions being involved in water management—large international ones and small ones and that it is up to a country what they need, in other words, it is not about ensuring participation at all costs (GWP ToolBox 2012).

5.2.1 Participation as a Means to an End

In many respects the GWP can be said to consider participation as a means to an end. For example, the GWP calls for participatory and consultative approach because in its absence "good laws […] can fail as they are not understood or accepted". Instead they claim, one has to create a feeling of ownership (GWP ToolBox 2012). In other words it would seem someone from the outside makes the good laws and then the job is getting people to agree with them. The GWP claims participation is helpful in implementing IWRM and the measure of good participation is when the people are "aware of the general goals and needs" (GWP ToolBox 2012). This also seems to imply an agenda and information from the outside, as the idea is that the people in question do not articulate their own goals, rather have to learn about predefined goals.

As a principle, participation is explained slightly differently by the GWP. While the Dublin Principles state that development and management "should be based on a participatory approach" the GWP goes further and explains why this is so. As they see it, participation is a way of achieving agreement. As mentioned, the question is then whether this only means agreeing with predefined goals. This is not to say that the GWP envisions communities which do not make any decisions themselves; in fact they claim that decentralizing decision making to the lowest level is "the only strategy to enhance participation". The question is rather what types of decisions can be left to the community within such a system.

The GWP see local empowerment as well as public and stakeholder participation in decision-making as a characteristic of sustainable river basin management (GWP ToolBox 2012) Although they later state that one needs a "sense of ownership on the part of the stakeholders so that they accept the monitoring, enforcement and regulation procedures" (GWP ToolBox

2012); it is this ownership that can be built using participatory management. Does this mean that an empowered person according to the GWP is one who accepts such measures from the outside, or do they mean that "empowered" means that these measures are created by the people who accept them? The GWP's view of community based organisations does perhaps imply the former. The GWP see awareness raising as a way of increasing ownership, and state that the community based organisations are able to "increase awareness of the need for sustainable water management" (GWP ToolBox 2012) Implied by this, is the view of such organisations as useful to relay a predefined message or value, but not, it seems, as groups who can determine what they think there is a need for in the first place.

5.2.2 A bottom-up approach organised from the top?

Perhaps not surprisingly when one considers the GWP's view of participation as a means to an end, the GWP seems to portray participation as something that is first and foremost organised and run from a high, national or even global level. To a large degree they view the concept of participation through a national lens. For example, according to the GWP, actions for water security "need to be embedded into national development plans" (GWP 2012). The GWP also lists policies and legislations as a first indicator when it comes to evaluating IWRM (GWP ToolBox 2012). On the other hand, they do say that stakeholders should be part of developing indicators so that they can "see how the information provided by the indicator relates to their concerns and activities" (GWP ToolBox 2012) However, regarding monitoring they also state that stakeholders "can" be involved (GWP ToolBox 2012) which overlooks the aspect of different results depending on who monitors. The GWP also demands that "national water laws must take into account any international obligation under bilateral/multilateral agreements or conventions". While this is perhaps not a very surprising requirement it illustrates their thinking of IWRM as a global overarching system into which smaller units such as nations, and under them local communities, can fit.

According to the GWP, actions for water security must also "bring together fragmented institutional responsibilities" (GWP 2012). When they then go on to say that "water security thus requires cooperation between different water users" presumably they are referring to high-level institutions, e.g. ministry of agriculture, rather than individuals. On the one hand they say one must have "continuous integration of all stakeholders" throughout the entire process, but the obstacles to this they see as fragmented responsibilities and a sector

perspective. Put like this, the individual user need not be included at all in the end, rather, their type of participation in terms of water security seems to mean that sectors must participate and cooperate together. Whether for example a ministry of agriculture and a ministry of environment have a good dialogue or not, need not have anything to do with the water users in a shanty-town for example.

The GWP focuses on the need to get those involved on an equal footing when it comes to information so they can figure out solutions to their problems amongst themselves (GWP ToolBox 2012). They support putting models of water systems and problems on the internet so that everyone can access them (GWP ToolBox 2012), so to some extent they deal with both consultation and communication. However the GWP first and foremost seems interested in sharing information between experts in different sectors, although they also mention using local wisdom together with expert knowledge to share data (GWP ToolBox 2012).

Despite the GWP's statement that community based organisations should be involved, looking at the rest of the ToolBox there is considerably little mention of the communities on the ground actually deciding what goes on. For example, the stated areas for change by the GWP are policies, legislative framework and financing and incentives structures (GWP ToolBox 2012). Are the community based organisations to operate within a new system defined at a national level? After all, the legislative framework is supposed to determine who gets what, as well as transferring customary entitlements and underpinning regulatory norms (GWP ToolBox 2012). On the other hand, the GWP also talks about local authorities and how "stakeholders should be connected to decision making processes and involved in a real dialogue with decision makers that can survive changes in government" (GWP ToolBox 2012). However they also state that "taking an IRWM [sic.] approach requires that […] water-related decisions made at local and basin levels are along the lines of, or at least do not conflict with, the achievement of broader national objectives" (GWP 2012). While this does not exclude stakeholders from being "given a voice," (GWP 2012) which the GWP promotes, it certainly means that they have little power to make decisions independently.

The GWP looks to the government to create policies which encourage participation (GWP ToolBox 2012) Policies which also set the goals and make the rules and regulations for achieving them. These policies can "assign responsibilities to […] basin organizations" (GWP

ToolBox 2012), which also seems rather top-down. It is the national policy which decides the extent of the decentralisation—in other words what the "lowest appropriate level" is (GWP ToolBox 2012). Although it might be difficult to envision decentralisation without a government being in favour of it (after all, the extent to which a local community can demand autonomy without challenging the whole system of rule is perhaps limited) the national policy addressed by the GWP here is suggested to include decision on uses of economic incentives as well as monitoring and the control of environmental degradation (GWP ToolBox 2012). What then is left for the participators?

A lesson learned by the GWP is that when different stakeholders participate it "often clarifies the issues" but that coming to an agreement is difficult (GWP ToolBox 2012). Therefore is states that the Government has to make the policies; ideally remembering what the opinions of the stakeholders are (GWP ToolBox 2012). From this it seems that the stakeholders are thought to be a part of making policies, but that in the end the government is usually the one doing it. But at least one can say that the GWP understands the potential for conflict and that people do not necessarily have the same view. Concerning regulation, including time and place of abstraction, it is the government institutions that are behind these (GWP ToolBox 2012). The GWP calls for water allocation regimes which focus on ecological boundaries of river basin, other water uses and also supports social and economic activities (GWP ToolBox 2012). It also concedes that this might "conflict with customary uses of water or indigenous perspectives that relate to water in a more holistic sense," but they do not say what to do about it. The GWP states respect for traditional rights and allocation regimes is a key factor for effective water allocation regimes (GWP ToolBox 2012).

In some cases the participation presented by the GWP sounds like something that is imposed or bestowed on a community. For example, the focus on inclusion of all people "especially for the most vulnerable—usually women and children—who benefit most from good water governance"(GWP 2012) gives the impression that these people are to be handed a better situation by someone else. The way participation to some extent is explained seems to exclude those participating. For example the GWP states that "participation means taking responsibility for and acknowledging impact […] on other water users and water ecosystems as well as committing to increasingly effective use and sustainable development of water

resources" (GWP 2012). What it here sounds like the GWP really is describing, is agreement with a predefined goal or vision, not participation. According to the GWP, in its explanation of the principles "a participatory approach involving all stakeholders is the best strategy to achieve long-term accord and consensus" (GWP 2012). Assuming that participants agree with what the GWP says it should, it seems likely that participation is the best way to achieve "long-term accord and consensus," but who is to say that the stakeholders who participate take the responsibility and commit in the desired way? Are they to be forced if they do not, or do they simply not count as participants? After all, the GWP's definition of participation seems to expect rather a lot of the stakeholders. However, this is perhaps to be expected if one sees participation as a means to an end. As the GWP put it: "Multi-stakeholder involvement in the decision making processes is essential for the acceptability of the outcome" (GWP ToolBox 2012), an outcome which the GWP does not seem to imagine those participating deciding themselves—at least not to any large degree. Possibly, the GWPs previously mentioned focus on information and on building a shared vision mean that the GWP does not intend imposing as an outcome where participation is concerned, rather it assumes that with the right information people will agree to a specific course of action.

5.2.3 How the GWP's interpretation differs from the Dublin Principles

Interestingly, in their explanation of water laws (GWP ToolBox 2012) the GWP states that a "water laws should recognise water to be a finite and vulnerable resource, an economic good, and a natural resource having cultural, social and environmental values". Here we have a quick summary of the Dublin Principles, but the two principles concerning participation are not mentioned. This could also substantiate my claim that the GWP sees participation first and foremost as a way to achieve some ultimate goals, not a goal in itself.

While the GWP stresses the importance of participation, as do the Dublin Principles, the overall picture from the ToolBox is that it sees participation in a pragmatic rather than a normative way, focusing on what can be gained from participation in terms of outcome, not empowerment. While the GWP supports bottom up as well as top down approaches, many of their tools focus largely on national or in any case pre-defined decisions which participants are expected to take part in.

This (the idea that participation should be used to achieve consensus) is different from the corresponding Dublin Principle and its explanatory text which presents participation more as a goal in itself, with focus on "involvement of users" and "full public consultation." They also mention "raising awareness of the importance of water" and could well be expecting that as soon as people have the "right" information they will make the right choices, but nevertheless, the Dublin Principle about participation presents participation and involvement of users and decision-making at the lowest appropriate level more as an ideal than the GWP. In addition to this the GWP claims that "Decentralizing decision making to the lowest level is the only strategy to enhance participation" (GWP 2012) and in a way this is both more inclusive and exclusive than the Dublin Principles. Because, while the GWP wishes to decentralize to "the lowest level" the Dublin Principle only states "the lowest *appropriate* level" (my italics), and who is to say what is appropriate? If people at the lowest level do not take responsibility for other users, is it then inappropriate that they should decide? On the other hand the GWP has made it clear how they think people should decide, excluding those who do not take the responsibility and commit sufficiently. While this is a legitimate concern, it still begs the question of what one then means by the term "participation".

The GWP take a very different approach to participation than the Dublin Principles when they say that "Appropriately organised, the public (civil society) can become a central partner in IWRM" (GWP ToolBox 2012). If IWRM is interpreted according to the Dublin Principles, there is no way the public could *not* be a central partner, when one was doing IWRM. Because the GWP sees the government as "organiser of the participatory process" (GWP ToolBox 2012), this might not then give room to for example women participating "in ways defined by themselves" as the Dublin Principle states.

5.3 A New Water Ethic according to GWP

Seen from the perspective of a new water paradigm, although the GWP focuses on water as one, connected limited resource, they still seem caught in a slightly supply oriented way of thinking about the resource. And in relation to urbanization they claim that IWRM is a framework for interventions that target all parts of the water cycle and also reconsiders how water is used, and which users should be using it (GWP 2012). This I would say was related

to the new water ethic. They also mention considering the urban water in a larger basin view and thinking about other users and the ecosystem. The GWP recognizes the multiple users of water, how everyone is using the same resource and how everyone is dependent on the same resource (GWP 2012). On the other hand, it focuses first and foremost of getting enough water (GWP 2012). Considering food production the GWP seems to see water primarily as an input in an equation which yields food, food that humans need (GWP 2012). Water is presented as a separate unit from the environment which you can add to food production and receive the wanted result. Naturally then having enough water becomes the main question. An alternative way of seeing it could for example be to think in a new way about what to grow. Instead the GWP does not question the need for water intensive products, rather suggests that they should be produced where there is a lot of water "it makes sense to produce the water-intensive products demanded in this world in those places where water is most abundantly available" (GWP ToolBox 2012).

Regarding wastewater the GWP also approaches this slightly supply oriented. On the one hand the GWP seem to think of water as an untapped resource. "The goal is to diversify sources and increase availability for different uses". However, the need to "match water of a certain quality to its intended use," is also stressed (GWP 2012). While it is hard to know what exactly they mean by this, the most logical assumption would be that "low-quality" use demands "low-quality" water for example grey-water for irrigation. In the latter case I would say that the GWP has a new water ethic dimension in thinking about what one is borrowing from the water cycle. Instead of just focusing on the quantity used, one also considers its quality and what one is putting back into the cycle.

In their explanation of conflict management the GWP echo Armstrong's (2006) point when they state that "disagreements are usually over interest and values rather than facts" (GWP ToolBox 2012), this view is not reflected however, in their take on education. The GWP focuses on "raising public awareness" and "creating a vision" (GWP ToolBox 2012). It acknowledges that one is talking about "deeply held attitudes" (GWP ToolBox 2012) and suggests education and campaigns to change attitudes to water (GWP ToolBox 2012). It sees education as an important way to change attitudes, focusing on formal education and "local museum and science exhibits" (GWP ToolBox 2012), perhaps envisioning a relatively well-of

population as they do not take into account that some or all of these media might be absent. GWP seems perhaps to have a rather wealthier place in mind.

There is also the question of what education will do. How does one know that raising awareness about a water situation will engender the reactions one is hoping for? Some cases might be already obvious—if people are in imminent danger or are feeling the problems already; but still they might for example trust in a god to solve the problem, or not care if the effects are in the distant future, or if they do not agree that there is a problem altogether. So while the GWP here does go further than the Dublin Principles in recognizing the need for changed attitudes, GWP also seems to assume that people will agree to its concerns as soon as they see the facts on the table in front of them.

5.3.1 Humans in focus

A healthy ecosystem is described by the GWP as something that supports the well-being of humans, and it is "therefore" we should sustain them (GWP ToolBox 2012). Here we see what Armstrong (2006) would call a utilitarian approach to the water ethic.

In a way it is as if they do not have their idea of water security based on one over-arching thought or understanding of nature. They do often talk about water as an important resource under pressure, and how it is important to everyone (GWP 2012), but so far it is hard to see how they link the two; talking on the one hand about the need for humanity to serve nature by protecting its water and on the other hand of the need for nature to serve humanity by providing water.

With regards to Environmental Assessment, the impacts the GWP states as particularly important are socio-economic impacts, public health impacts, the size of area affected, change in water available for beneficial human uses, water quality or other beneficial uses impacts. (GWP ToolBox 2012) Apart from "other beneficial uses" perhaps as well as the size of the area affected, this is not really a question of the environment as much as it is of people.

Their focus on quality of water is also about it ultimately being used to drink and therefore being protected (GWP ToolBox 2012). Even if the aim is protecting water in the environment from human impacts, it is because "preventing raw water contamination in the environment protects sources and ensures cost-effective drinking water quality at the tap with low

treatment costs" (GWP ToolBox 2012). From this one might infer that protection could be abandoned if a cost-free cleaning mechanism was invented. From the above it would seem that the GWP to a large degree have what Armstrong (2006) would call a utilitarian approach. For example the GWP calls for regulation of "human impacts on freshwater-related fauna and flora" (GWP ToolBox 2012) which seems outside the utilitarian approach. It also mentions that agriculture will have to be done with less water, and that water disasters such as floods can be beneficial for the environment and must be considered according to this (GWP 2012). Furthermore, a priority of IWRM plans should be ecosystem protection and conservation (GWP ToolBox 2012), and the focus on conservation would seem to be a consideration other than human needs. It does however mention the intrinsic value of water, though this is in reference to human development that human development needs water security, and in order to have that the intrinsic value of water has to be considered (GWP 2012).

In reference to land use, the GWP sees the environment before the humans. They state that land planning has to safeguard vulnerable areas, wetlands or rivers when one is looking to build housing or infrastructure (GWP ToolBox 2012). In other words it is interesting to note that when other uses such as land, come into the picture, protection is mentioned, but that otherwise it is water for the humans which is in focus. However when talking about legislation to protect freshwater ecosystems there is protection for protections sake to maintain biodiversity, protect endangered species, avoiding damage to the environments (GWP ToolBox 2012). Interestingly this is about the environment, and species, not the water itself, so more of a consequentialist ethic than intrinsic.

By and large however the aim seems to be to protect humans, and indecently that will mean protecting water. One could imagine another view where we saw nature, and human life as a part of it, is so complicated that in order to ensure our survival (and thriving) one has to act on a precautionary principle trying to avoid big disturbances in this system. That would be another way of seeing it than the GWP does. They are focused on human wellbeing, with water for nature related concern. The GWP claims one has to "make the economic case" (GWP 2012) for management of water, this is the way to get governments and decision-makers on board. This of course does not necessarily reflect the view of the GWP. The point here is not to underplay the need for water experienced by millions of users; however by

choosing this as its focus, the GWP is taking on a slightly different approach to water than IWRM according to the Dublin Principles.

When explaining what water management consists of it is "allocating water to major users and uses, [and] maintaining minimum levels for social and environmental use while addressing equity and development needs of society" (GWP 2012). This I find surprising because surely a more important aspect is evaluating the allocation in the first place? One could for example focus on allocating minimum and leaving more for social and environmental use. On the one maintaining minimum levels for the environment (and society), means ensuring these needs from the beginning. However, this leaves little reflection on how much humans actually need, because it allocates the rest to production.

5.3.2 How the GWP's interpretation differs from the Dublin Principles

GWP stresses that it is no longer about how much water there is. However their framing of what the "challenge" is for the world is about using the water for the good of people, not nature and no mention of the intrinsic value of water (GWP 2012).

The GWP is very people-oriented. There is nothing strange about this at all, and of course the Dublin Principles recognize the importance of people, however in my opinion they are primarily trying to protect water as a life giving source in general, whereas the GWP seems to focus on protecting people, and people need water, hence their water protection scheme.

5.4 Summing up

This chapter has presented the GWP's approach to the three chosen elements of IWRM ("water as an economic good", "participation", and "a new water ethic"), and discusses how this approach differs from the Dublin Principles. Concerning "water as an economic good" the Global Water Partnership (GWP) has two contradicting positions. It claims that recognizing water as an economic good is about allocating water to meet the greatest need of society; a claim which is much in line with the second school of thought on "water as an economic good". However, the specific measures of the GWP do in fact have more in common with the first school of thought, relying heavily on markets and economic incentives, and also showing great concern for the cost of water and how to cover this. There is on the

other hand much focus on laws and regulations, and the GWP can perhaps best be described as proponents of the first school of thought although with overarching regulations to protect people and the environment. The approach to "water as an economic good" differs from the Dublin Principles, primarily in that it sees recognizing "water as an economic good" as an easy way to deal with water, which allows for environmental protection, while the Dublin Principles describe this element as a tool that will lead to environmental protection. The GWP's approach to the element "participation" differs from the Dublin Principles, which saw participation as a goal in itself, in that it mainly sees participation as a means to an end, and something which exists within a predefined system. This is perhaps explained by the GWP's concern that conflicts might hamper the outcomes of participation, but also by their focus on nations as the main actor. In terms of "a new water ethic" the GWP's largely focuses on humans (as opposed to the environment and the resource itself) albeit with some limitations.

Part Two—Yemen: The National and Local Level

6 Yemen—from off-the-map, legendary sanctuary; to on-the-map infamous problem area

Strategically positioned at the South-Western tip of the Arabian Peninsula, Yemen occupied an important role in ancient history and was for a long time central to trade, not only as a mid-way post between the East, and Egypt and Mesopotamia, but also as a supplier of frankincense and myrrh, important goods to the Roman Empire who's geographers famously named the region Arabia Felix (The Happy Arabia). From this trade a civilization emerged in the millennium BC (Burrowes 2007: 197), a country which for centuries was known as a mystical safe haven for travellers. Jean de la Roque who journeyed there the first decade of the 16th century to explore the coffee production and trade "found the Arabians a civil sort of people, and more accustomed to the strangers than we imagined (de la Roque 1726: 39); the king of Yemen they were told, "always took care to have the *Europeans* treated well" (1726: 76). Nearly 200 years later, an article on the plant-life in Arabia Felix noted that the country was "distinguished above all other parts of South Arabia, for the safety of travel and the well-tested courtesy of the inhabitants towards Europeans" (Plant-Life of Arabia Felix 1889: 213).

Sadly, today Yemen is better known for reoccurring kidnappings, its more recent and unfortunate claim to fame as a new hot bed for Al-Qaida's Arabian Peninsula branch (AQAP), as well as an American drone strikes target (see for example Whitaker 2013). Security troubles are not the only thing ailing Yemen however. The country's dwindling water supply has for some time been a cause for great concern. With very little surface water, and limited rain, agriculture has been supported by groundwater abstraction which far exceeds replenishment. Currently groundwater-table levels in Yemen are sinking at a rate of 1 – 7 metres per year (Al-Asbahi, 2005), and current and future demand for water exceeds the sustainable supply of renewable water resources in the country (Negenman 1997: 74). In 2009 The Times made the dismal prediction that Yemen might be the first nation to run out of water (Evans: 2009). This background chapter hopes to give the reader a very brief introduction to Yemen in general, and to past and present water management.

6.1 Demography, Society, and Politics

While Yemen's history might hark back to thousand-year-old kingdoms, today's Republic of Yemen is relatively new. It came into being in 1990 when North and South Yemen re-united after one and a half centuries of separation (Burrowes 2007: 199). Earlier, North Yemen was ruled as an imamate after the Ottomans were driven out in 1918. The *imams* ruled until 1962 when a civil war erupted pitting the republicans against the supporters of the imamate. It ended in 1967 with the republicans winning (Selvik & Stenslie 2011: 91). In the South, the British colony of Aden was created through agreements with the *sheikhs* and *emirs* after the British occupation of the city in 1839, and the Ottomans took the north a decade later and the two powers created a border and splitting the area (Burrowes 2007: 199). When the British withdrew in 1967 The Democratic People's Republic of Yemen (South Yemen) was formed (Selvik & Stenslie 2011: 91). In the North the imams, in a conservative, tribal society kept a traditional Islamic culture until the imamate was overthrown and the Yemeni Arab Republic was created. In the years that followed, the Yemeni Arab Republic opened up to the rest of the world (Burrowes 2007: 200). South Yemen was mostly under the British in name; it was the Port of Aden that was of interest to the British and the rest of the country had little if any connection to the Aden Colony. As a consequence the port was better connected to the rest of the world by sea than it was to the interior of the same country (Burrowes 2007: 200-201). Most of the areas outside it were not linked to the economy and had their own traditional political systems. These were in effect small states which were under Great Britain's protection in exchange for their loyalty (Selvik & Stenslie 2011: 91).

Ali Abdullah Saleh who ruled North Yemen from 1978 and continued to rule the entire country and after the unification of North and South Yemen in 1990 and remained in power until he was deposed during the Yemeni uprisings 2011 – 2012 which were part of the "Arab Spring" in the region. The "Arab Spring" in Yemen could perhaps seem to be one of the more successful ones. There were relatively few casualties and no prolonged violence, the president stepped down and the country began a National Dialogue. However, according to Sheila Carapico (2014) what one is seeing is not the demands of the protesters being carried out, but a collection of different agendas both from within and without the country, pulling in different directions without necessarily securing a peaceful future for Yemen.

Of the other Middle Eastern countries, Yemen is medium in size. At 527,968 km^2 (slightly larger than Spain) it is neither one of the tiny gulf countries nor one of the North African giants. Its people are predominantly Muslim, of whom *Zayidi Shi'a* constitute 50 per cent, and the rest are mainly *Shafi'I* and *Isma'iili* Muslims (Selvik & Stenslie 2011: 90). The population of Yemen today is estimated to be 26.1 million people with a population growth among the world's highest (HDR 2013). With an urbanisation currently at 32.3 per cent (Central Intelligence Agency 2014), it was counted in 2011 as the least urbanized country in the Middle East (Selvik & Stenslie 2011: 90). This rural population typically lives in small communities scattered across the country, often in hard to reach mountainous areas (Dasgupta et al. 2009: 383) out of reach of the road network (Salisbury 2011: 6) with little access to basic such as piped water and electrics (Burrow 2007: 203).

While Yemen as an entity has existed for centuries (unlike other countries in the Middle East such as Jordan or Iraq); this has not gone hand in hand with unified power. Around 1900, before the merging of South and North Yemen, there were in fact numerous centres of power within the two states (Dresch 2002: 1). There does however exist a common Yemeni identity much helped by a long and reoccurring occupation by the Ottoman Empire (Burrowes 2007: 199).

Another important factor is all the ancient history one has from Yemen, which helps create the image of a "natural unit" even if this has never been the case when it comes to having power over the entire country (Dresch 200: 1). The government in Yemen does not always have the legitimacy it needs to impose laws and regulations, and these are often strongly opposed (Lichtenthäler 2010). The legal system of Yemen is based not only on Islamic law, Turkish law, and English common law, but also on *'urf*—tribal, customary law (Burrowes 2007: 198). The central government is based in the capital Sanaa and the rest of the country is divided into 20 governorates. While the government's presence is officially the same throughout the country via these governorates, in reality it varies greatly (Dresch 1989: 22).

As the state has in general had limited capacity when it comes to administering its far away regions and in many places other institutions take its place. An example of this is the so-called Local Development Associations (LDA) which emerged onsite to fill this gap (Cohen et al. 1981: 1041). Dresch (1989: 22) describes the LDAs as an example of how the Yemeni

government "allows considerable autonomy to local organizations" and how these co-operatives in many places become the main political organization. Yemen has always been characterized by numerous centres of power, and as the state does not have the monopoly of using force within its borders and it is always vying with others for power, it is often regarded as a "weak state" (Selvik & Stenslie 2011: 89-90). For example the territorial borders drawn by the tribes, North-East of the capital are far more important than government borders (Dresch 1989: 22, 24). Selvik and Stenslie offer one possible explanation for this fragmentation, namely the geographical characteristics of Yemen which makes communication difficult (2011: 90).

Personal ties play an important role in Yemen, and most of the economy is controlled by a network of elites (Salisbury 2011: 9). And people in Yemen "see almost all business activity as being corrupt in some way" (Salisbury 2011: 10). The elites according to Salisbury (2011: 10) consist of technocrats, security services, tribal groups, politicians and tradesmen. A few groups from these elites control the majority of large companies and institutions in Yemen's economy (Salisbury 2011: 11). In many ways the regional power structures are better established than the central power of the president, and according to Day (2012: 6). Hovden (2007: 52) explains that actual power does not belong to the state alone, but is divided between the state, the financial elite and the tribal system; all influenced by corruption and a patronage system.

The tribal people claim to be different from others because they are supposedly descendants from one, legendary figure—Qahtan son of Noah (Selvik & Stenslie 2011: 90). During the imamate the tribes were not necessarily in direct opposition to the ruling power, but they were not under it either. They were on the outside and could support it and protect it or oppose it as they saw fit (Burrowes 2007: 210). Even today Burrowes claims that the Republic of Yemen is reminiscent of the old imamate in that "the state is severely limited in terms of what it has the power and authority to do and where it can do this" (Burrowes 2007: 210). Caton explained that tribesmen "would fundamentally oppose any state compromising their autonomy." (1990: 27).

While the tribes limit the power of the government they are also used by the government. According to Selvik and Stenslie (2011), president Saleh carried out "survival politics", filling

important political and military positions with people from his own family or tribe. This does not however mean that his whole tribe is favoured. The same goes for his way of controlling society where he has "co-opted" tribal and religious leaders; estranging the leaders from the groups they represent (Selvik & Stenslie 2011: 94).

According to Dresch (2002: 198) "most of Yemen's population makes no claim to be tribal in any sense", while Burrowes grants that it can be the most important factor for social organization and identity, he explains that this is mostly in "the highlands of North Yemen and, to a lesser extent, in the mountainous region between the two Yemens and in remote parts of the Hadhramawt" (2007: 204). Therefore it is important not to overdo the significance or presence of tribalism, since caste, class, or occupation can for many Yemenis be a defining and more important identity (Burrowes 2007: 205).

In recent years however, according to Sheila Carapico (cited in Selvik & Stenslie 2011: 94-95) "belonging to a tribe or clan has gained renewed importance as a source of political mobilisation in Yemen". Because of lacking alternative options many southern Yemenis have seen clans and tribes as a way gaining political bargaining power. While tribal power in some cases or areas might be limited, what is clear then is that there are several other power holders in Yemen which affect the state's ability to act, and that the country can be characterized as decentralized.

6.2 Resources and Water Management

Yemen has always had limited water resources, but this current lack of water is affected also by the country's limited resources in general. Both the population and the country in general struggle economically. Unemployment in Yemen is estimated to be at 35.2 per cent (Library of Congress 2008) and of the working population most people work within agriculture. Although the sector provides employment and income to over 55 per cent of the active population, agriculture in Yemen contributes only 14—23 per cent to the country's GDP (Abu-Hatim & Mohamed 2009: 367). There is very little modern industry and one very important source of income has instead been the remittances of Yemenis working abroad (Burrowes 2007: 204). Yemen benefited from the oil-boom of its neighbouring countries which created job opportunities abroad, and in 1981 the remittances sent by workers

amounted to one third of GNP (Varisco 1990: 293) (Varisco here refers only to the Yemen Arab Republic North Yemen). During the Gulf Crisis of 1990 Yemen fell out with Saudi Arabia and most from the Yemeni foreign workers were forced to return job-less (Okruhlik & Conge 1997: 559-560). The oil reserves which were discovered in the 80s have been declining production wise since 2003; however Yemen's gas reserves are being developed now (Burrowes 2007: 204).

As its population began working abroad, most of them in Saudi Arabia or in the other Gulf countries, Yemen went from being one of the world's poorest countries to a relatively better situation due to the remittances. Most of the money sent home as remittances bypassed the state (Burrowes 2007: 211) remaining outside the banking system (Dresch 1989: 19). This money meant electricity and water pumps as well as a great increase in foreign food imports. Until the 1970s farming used spate irrigation during flood season, or run-off irrigation as well as shallow hand dug wells to grow their crops (Lichtenthäler 2000). However groundwater became accessible in the 1970s through new technology and the remittances from workers abroad (Lichtenthäler 2000: 151; Negenman 1997: 72). The money was often invested in irrigated agriculture especially on fruit trees which demanded a lot of water, but also brought high income, as opposed to the traditional crops such as wheat (Lichtenthäler 2010) By 1990, 130 per cent of Yemen's renewable water resources were being used for irrigated agriculture (Abu-Hatim & Mohamed 2009: 368). This means that one was not only using all of the water that would relatively easily be replenished; in addition one was using water that would take longer to replenish. According to the authors this overdraft figure rose to 50 per cent in 2005.

As incomes went up, people could consume more, but the domestic market did not follow the demand. In general in the Middle East there was little incentive for agricultural growth, especially grain, due to several factors: difficult rain conditions, rise in labour costs and government price disincentives. This meant that one relied more and more on importing food (Richards et al. 2014: 147). The liberal trade policies which existed in the 70s meant that grain did not get more expensive while most other things did. Many areas could not intensify production and were instead abandoned. Domestic grain production went down and more had to be imported (Kopp 1985: 46-47). In answer to this situation of increased import, the Middle Eastern governments had two things they could do, increase their own export, and or

produce more food themselves, (or both). Despite the limitations set by water, the last option was what most countries had the capacity to do in the 1970s (Richards et al. 2014: 148).

Faced with rising inflation the government tried to fix grain prices, ban import of fruit and also encourage the local agricultural production in general (Dresch 1989: 16-17). Local production required water and it became paramount to the development mission of the state to develop groundwater resources (Moore 2011: 44). Thousands of wells with fuel driven pumps were set up, not only by the state but also by the private sector, aiming to increase agricultural production. Farmers could get loans, subsidized by the government, from The Cooperative and Agricultural Credit Bank (CAC-Bank), and diesel and electricity prices were kept down (Hellegers et al. 2008: 41-42). Recently it was estimated the Yemeni government spends 24 per cent on petroleum subsidies (Richards et al. 2014, 420). Moore points out that because the World Bank and other donors liked the idea of technology driven groundwater irrigation projects, this drove the state to carry out such projects because that is where they got loans (Moore 2011: 43).

While on the one hand grain production went down, local production of *qat*, a mild narcotic plant extremely important in Yemeni society, on the other hand exploded as people with more money to spend became buyers and farmers abandoned grain production in favour of *qat* (Weir 2007: 20). Not only is *qat* very important in the Yemeni society, it is important to the economy as well, accounting for six per cent of the country's GDP, and one third of the agricultural GDP (Lichtenthäler 2010). The adverse effects are many; for people and for the water. *Qat* might be responsible for almost a third of all water withdrawals (Lichtenthäler 2010), and also eats significantly into the budget of poor families who buy *qat* rather than food.

There are several reasons for the ongoing *qat* production in the country. One thing is that it has become an important part of the Yemeni economy. The incentives for those who grow it are many. The plant can survive periods of drought and still produce the sought after shoots when watered heavily, and one can also harvest a chosen amount to get the money one needs, as opposed to the entire crop in one go (Hellegers et al. 2008: 41-42). While importing *qat* from Ethiopia would in fact be cheaper; although this is allowed in theory, *qat* producers make sure such imports do not happen. Regulations determined centrally are often not

enforced because customary laws decide what is done on a local level (Hellegers et al. 2008: 42).

Today Yemen is still in a difficult position with regards to its food supply. Yemen imports much of its food and is among the top countries dependent on food imports (Ecker et al. 2010: 26). The International Food Policy Research Centre (IFPRI) categorises macro level[5] food security in Yemen as low, and estimates that it will stay that way through 2020 (Ecker et al. 2010: 15). In 2007, approximately 60 per cent of all the food consumed in the country was imported. Within this, staple foods figured highly with cereals at 70 per cent, wheat (the main staple) at 90 per cent, and rice at 100 per cent (Ecker et al. 2010: 26). To pay for these imports, Yemen spends a quarter of its exports on buying food; this is compared to the global average of 9 per cent or 11.5 per cent in the Middle East and North Africa (Ecker et al. 2010: 14). These exports consist mainly of crude oil (90 per cent of exports between 2000 and 2007) but at the same time as food imports are raising, partly due to population growth, the oil reserves are dwindling, and the country is estimated to become a net importer of oil in 2015. Increased export of gas will soften the blow somewhat but will not be able to compensate completely (Ecker et al. 2010: 26-28). This in many ways explains the predicament Yemen is in, far from food secure, yet rapidly running out of water.

Yemen has always been affected by the limited amount of water available. In 1975 population distribution was a mirror of the rainfall distribution (Kopp 1985: 44). While this reality has changed with the arrival of deep well technology, the limited water resources of the country is one of the biggest challenges it faces today. The constraints on fresh water in Yemen are extremely severe with estimated availability at $150m^3$ per person per year. This is 10 per cent of what is the average availability in the region and only two per cent of the global average (Abu-Hatim & Mohamed 2009: 367). The country has always been one of varied and constrained water supply, and has since ancient times been forced to find ways to deal with water. In Yemen water has been a part of shaping the political reality by dictating where people could settle, demanding rules and regulations for water use, and sometimes making the rich richer and the poor poorer. The ancient story of the great *Ma'rib* dam which made agriculture possible, and whose collapse, told in the Qur'an, has now become what Dresch

[5] Referring to the country as a whole as opposed to individual families.

calls “the mythical moment of Yemen’s own collapse” (1989: 6) when the tribes of this previously highly civilized area migrated and it went into decline.

Burrowes describes Yemen as “the upturned corner of the rectangular plate that defines the Arabian Peninsula” (2007: 202) and the mountains do indeed rise up to cup the country to the West and South. The mountain range from north to south descends slowly to East until it reaches the Empty Quarter, while to the West it cuts steeply down towards the Red Sea hitting the desert *Tihama* Plain along the coast (Burrowes 2007: 202).

While the climate is semiarid in the highlands, the monsoon coupled with the mountain range causes humidity to collect and deliver seasonal rainfall in the mountains and highlands, and this rain has made intensive cultivation possible (Burrowes 2007: 202-203). Agriculture in Yemen has traditionally depended on these monsoon rains which produce two rain seasons per year, in the spring and in the late summer (Dresch 1989: 8-9). It rains the most in the mountains, but it can be sporadic and some places do not receive much water even in good years, forcing them to make the most of what they have by various water collecting and directing techniques (Dresch 1989: 9). The great civilizations of ancient Yemen lay to the west of the mountains which run from north to south, and were based on runoff from the hills. However in recent history (Islamic times) the once extensive agriculture here is more or less gone and the area is dry (Dresch 1989: 8). The *Tihama* plain also relied, and still does, on the water runoff from the mountains, but it was never a powerful area like the areas east of the mountains (Dresch 1989: 8).

The traditional and ancient irrigation systems of Yemen were very country specific and adapted to the local setting (Moore 2011: 41-42). Eirik Hovden divides the traditional forms of irrigation in Yemen into three categories: 1, Spate irrigation, 2, Terracing and Water Harvesting, and 3, watering from natural springs (Hovden 2007: 49-51). Spate irrigation is done on the sides of *wadis* where water is divided during seasonal floods by temporary or permanent weirs. Water is then led through canals (earthen or lined with concrete) sometimes several kilometres long, to the fields. The fields are surrounded by a bund, typically half a metre tall, which allows the farmer to inundate the field (Baquhaizel et al. 1996: 45). One finds the largest examples of spate irrigation where large valleys from the mountains enter the coastal plain. When the size of the system is large enough, several users have to come

together to co-organize the operation and maintenance of the system. Daniel Varisco argues that traditional irrigation systems are most prone to conflict as they involve a lot of people, and because of the irregularity of both time and amount of water, as well as the difficulty of measuring water (Varisco 1983, cited in Hovden 2007: 50).

There are different rules governing various water sources in different places of the country, and these can also differ across the country (Ward 2009: 240). In spate irrigation for example, upstream riparians are awarded priority according to the rule known as *al 'ala fa al 'ala* (Ward 2009: 240), roughly translated to "those furthest up first", which stems from a *hadith* where the Prophet declared that water should pass to those further below when the one above had filled their fields up to the ankle (Maktari 1971: 29).

Springs are different and can have other rules: "In *springs*, which have more stable flow regimes, rights normally are attached to the land. The rights are denominated in time-shares" (Mundy 1995, quoted in Ward 2009: 242). These timeshares could be exchanged amongst farmers and it was *sheikhs* who ruled in disputes, while you had special people to oversee the distribution.

Terracing where crops are planted on terraces in mountains several thousand metres over sea level where often earth has been carried in place and water from rain is diverted to these terrace fields in canals. The canals are also supposed to break given very heavy rain (Hovden 2007: 50). Hovden notes that this is part of a more general principle, with specific rules, in Yemen where one uses rain water from uncultivated areas to feed another area under cultivation (2007: 50). The springs are natural occurrences of water in the mountains which generally yield small amounts that can be used in a small group of farmers. In cases where there was too little water available at the time for it to reach the farm, one would collect the water in a large basin and then each farmer would have a turn of a full basin. In these cases the right to the land usually corresponds to a right to water (Hovden 2007: 50-51). Concerning water for domestic use, this is usually collected from wells, but in the mountainous areas where there is little groundwater it is collected in cisterns, usually owned and managed by the villagers as common property, during rain.

The traditional water systems had the benefit, according to Moore, of keeping land and water rights together. But in 1976 there was a division of land and water rights, which led to development of irrigation sources including groundwater. (Moore 2011: 44 citing Lichtenthäler 2000:147). However, Lichtenthäler in fact explains that population growth put pressure on the available land and caused conflict, much because of the strict traditional rules connecting land and water. According to tradition no agricultural production could happen on land which supplied another farmer's land with run-off water. As land became increasingly limited to the growing population the traditional system was already under pressure (Lichtenthäler 2000). Therefore, it is questionable how suited this rule would have been over time to keep agricultural expansion at bay.

Up until the middle of the 1800s the state was not involved much in water supplies, this changed during the 1900s where the state became the "owner, manager, and regulator of water supply infrastructure" (Bakker 2003:18 cited in Moore 2011: 40). The extent to which the state is actually able to intervene with local management is in any case limited. According to Hovden (2007) the state in Yemen does not have the needed legitimacy to challenge old rights concerning water. However its changed approach to water certainly had an effect on the resource. Moore argues that the state's role in managing water was part of a bigger quest for territorialisation where one linked people and resources, to the national territory and sovereignty. He points out that while the state intervened in some cases in the past, for example organizing maintenance of the great *Ma'rib* Dam and conduits, which required masses of people, largely there was community level management. Traditionally the farmer was responsible himself. *Sheikhs* would resolve conflict, and "water-masters" were employed locally to carry out maintenance; all this was embedded in customary law which dictated for example that upstream users were the first-serve group, and the run-off rights-rule (Moore 2011: 42).

Moore claims that infrastructure projects, for example expansion of groundwater-fed irrigation, were done to co-opt local elites and spread the state's legitimacy (Moore 2011: 39). Irrigation projects would of course depend on groundwater as there was no other water in Yemen to take from. Thus, groundwater abstraction was identified with the expansion of the state and led many rural elites who were sceptical of the state to dig their own wells so that

they could show they had power like the state (Moore 2011: 44). As the two Yemens were reunited in 1990, the state had a weak North-South connection which made the control of outlying tribal areas even more difficult than it already was. To achieve stability, the focus was on legitimizing the state in the eyes of the citizens through development projects, enriching families in general, and "consolidating power by ensuring influential groups have wealth and prestige" (Ward 2000: 388). The government was interested in farmers as an important voter-group and policies such as loans via CAC-bank and diesel-subsidies spurred on the development of land using groundwater (Moore 2011: 43). Financing groundwater abstraction on someone's land became an act of patronage as this became a symbol of (and practically was) wealth (Moore 2011: 43). The government has generally been able to regulate demand by setting diesel prices, credits, and has used this to increase the water abstraction, up until the 1990s. This let them legitimize themselves and acquire alliances. According to Ward these policies penalized the traditional water harvesting (Ward 2009: 239). In 2008, Sarah Phillips found that much of the subsidized diesel ended up in the hands of smugglers, but that the president was unwilling to do anything about the situation for fear of losing their political support. As much as 50 per cent of the money used for diesel subsidies was at that time taken out of the country instead (Phillips 2011: 108).

Diesel prices have been heavily subsidized in Yemen for a long time – this changed somewhat with the uprisings of 2011 when the subsidise were lowered, although still remaining high. Because groundwater is the most important source of water supply in Yemen and this groundwater is mostly pumped with pumps running on diesel, the availability and cost of water is closely linked to that of diesel. Agriculture which is a great consumer of water also consumes 12 per cent of fuel in Yemen (Salisbury 2011: 5).

Since the 1990s Yemen has been making changes in its low fuel price subsidies (IMF 2013: 72) In 2005 the diesel prices were increased with approx. 100 per cent, and in 2010, at the request of the International Monetary Fund prices increased again with about 30 per cent. In 2011, Yemen was on several occasions unable to pay for oil imports and received donations instead (Bertelsmann Stiftung 2014). Oman, Saudi Arabia and the United Arab Emirates donated oil to Yemen (Salisbury 2011: 13). According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) diesel prices on the black market in 2011

were 567 per cent higher than the official price (OCHA 2011), the World Food Program (WFP) estimated the prices to be between 233 and 300 per cent higher (WFP 2011).

During the unrest in early 2011—when Yemen was already unable to import the needed fuel from the international marked (IMF 2013: 73)—the main pipeline carrying crude oil to Yemen's only refinery was bombed, leading to a dramatic decrease in supplies and increase in price as a black market emerged to peddle the limited fuel available (Gatter 2012: 583).

The pipeline that was bombed carried oil from Yemen's fields to be refined and consumed in the country, as well as exported so that the country could buy cheaper oil for domestic refinement (Salisbury 2011: 13). Farmers who use diesel to pump groundwater were severely affected by the high prices, and in many places farming activity stopped (Gatter 2012: 583). Only *qat* production was unharmed because while people were unable to buy enough food, they would still prioritize *qat* at a price high enough for the farmers to buy water on the black market. Furthermore the plants' properties which allow it to hibernate during drought and re-awaken as soon as watered also meant that these farmers could tolerate the hike in prices (Gatter 2012: 584). The official price of diesel increased with 100 per cent in April 2012, from 50 YR to 100 YR (Kojima 2013: 74). This increase was done to counter the black market which had emerged (Al-Samie 2012). However, Yemen is still facing a shortage in diesel and potential black markets (Al-Karimi 2014).

Moore stresses the benefit of the traditional system which did not permit groundwater abstraction except in exceptional cases (Moore 2011: 42). However, just because Yemen traditionally had elaborate management systems, this did not mean that water management used to be unproblematic. As Ward points out: "Even so, frequent disputes arose. These were resolved by force of arms, local reconciliation procedures, or traditional judgment" (Ward 2009: 233). Previously the water scarcity had triggered many tribal conflicts. Traditional laws concerning run-off rights gave way to privatization of land and expansion of agriculture. With the possibility to irrigate fields with groundwater from one's own land, conflict could be avoided (Lichtenthäler 2003: 73).

As groundwater tables sink, wells have to be deepened and more diesel is required to pump the water. A trend today is that only the richest can afford to dig deep enough wells to reach

the water, and even public water works have trouble reaching the groundwater, creating room for private actors selling the water (Hovden 2007: 52). In the capital for example, the state is only able to provide 35 per cent of the needed water, the rest is bought privately (Lichtenthäler 2010). The actors outside the towns are unwilling to enter into deals with the water works and prefer to instead use the water to grow *qat* or sell it (Hovden 2007: 52). Hovden describes a situation where whole towns are facing an acute lack of water while the farmers surrounding the towns are pumping water from the ground for irrigation, and the state is unable to stop this (2007: 52). An example of the dramatic increase in groundwater pumping is the northern governorate of *Sa'da.* There, fear of government expropriation of fallow land in the name of food self-sufficiency, as well as the fruit import ban in 1984 gave incentive to irrigate and grow crops in new areas. From 1983 to 1984 the number of wells increased from 84 to 274 (Lichtenthäler 2003: 91-93). As the groundwater has been extracted at far higher rates than it recharges, many farmers in the area can no longer afford digging deeper wells or operating more powerful pumps. The result has been a 50 per cent lower crop yield in the area since the 1980s (Lichtenthäler 2003: 182). This however, does not mean that the groundwater is left untouched. Instead, a few wealthy landowners are accumulating land and increasing their production using more water, as the poorer farmers sell off land to pay for their wells (Lichtenthäler & Turton 1999: 5).

When political authority is what is being used to manage water one ends up with distributing to the select few who support this authority (Moore 2011: 40-41). Moore argues that in many ways the inequality and power games have determined who gets water today in urban societies the poorer community is marginalized and excluded from clean water and "the power of elites is reinforced through preferential access to [this] public good" (Moore 2011: 39). This he claims is also true in rural Yemen where the combination of a developmental state and resource capture is destroying traditional ways of managing water and replacing them with marginalizing institutions.

On the one hand, the state has difficulty dealing with the current situation; on the other, so do the traditional systems. According to Hovden (2007: 52) there are no institutions which have managed to create a mutual understanding where groundwater under private land does not belong to the landowner, and that each individual cannot drill wells as wanted.

6.3 Concluding Remarks

In other words Yemen has been quite unfortunate with its circumstances related to water resources. Limited renewable water sources, population growth, poverty, food insecurity, traditions, technology and a weak government have all contributed to the current scarcity of water in the country, and most of these factors are still in play today. Any solution to Yemen's water problems must therefore be able to navigate these contextual realities.

7 Stage III – Implementation

This chapter looks at how the government of Yemen approaches IWRM, both in terms of what it tries to do, and what it is able to do. My problem statement concerns *Wadi Zabid* and the potential for IWRM there, but IWRM policies reach *Wadi Zabid* through the Government of Yemen, so any possibilities for IWRM in *Wadi Zabid* will also be determined by the limitations and obstacles to IWRM in the Yemeni government. In other words, there might be clear possibilities for example for participation in water management in *Wadi Zabid* in the case that people are willing and have the needed capacities, but if the government does not create an environment for participation, these possibilities in *Wadi Zabid* will not be realised. Therefore, regarding the government, what matters for *Wadi Zabid* is first and foremost what the government is *able* to do in terms of IWRM. However, what they are able to do depends of course on what they are *trying* to do. Therefore this chapter aims to both say something about what the government tries to do in terms of IWRM as defined in Stage I, in other words how they interpret the concept (or in this case the three elements I am looking at), but also what they are actually able or unable to do due to the contextual realities they are faced with. I will explain this by investigating in light of the theoretical perspectives, how the three chosen elements "water as an economic good", "participation", and "a new water ethic" are approached through policy changes, institutional changes and legal changes. This chapter is divided into three main sections. Section 7.1 presents the changes happening in the government in relation to the three elements and in light of the theoretical perspectives, section 7.2 presents the realities the government is faced with in terms of water management and discusses the affect this has on the changes presented in 7.1, and section 7.3 sums up the findings of the chapter.

7.1 Changes in Government Approach to Water Management

With the increasing water stress in the country, Yemen has begun to alter its approach to the resource somewhat. The government's earlier policy of promoting development, raising farm incomes to secure support from influential groups began to be felt, both financially for the government as well as environmentally for the country in general. Hence, at the end of the 90s they began to make changes (Abu-Hatim & Mohamed 2009: 368-369). The government tried to decrease the amount of water abstracted by raising diesel prices, less loans and credits,

regulation and taxation of groundwater equipment and "projects to support increased water productivity in agriculture". The diesel price increase however, did not work because it was overtaken by inflation and did not constitute a real increase according to Ward (2009: 239). This new approach is also reflected in the institutional set-up of the government.

Today, Yemen has one organ, the National Water Resources Authority (NWRA), which is in charge of supervising the management of water resources (Hübschen 2010: 87). Negenman (1997) explains that it was the end of a long struggle when the (NWRA) was created in 1995: After the unification of North and South Yemen, the Ministry of Agriculture and Water Resources (MAWR) was created. However, it was criticised because it was seen to be serving two purposes: protecting the country's water resources, and also providing farmers with irrigation water (1997: 73). One mechanism proposed by the MAWR was a water and irrigation law, but this came to nothing. The MAWR also began to work on a way for the government to carry out "an integrated comprehensive and sustainable approach to water resources management" (Negenman 1997: 73). The result was a national water policy document which recommended planning and regulation of water to be separate from the users of water, leading to the establishment of NWRA. NWRA was to plan, develop and manage water resources as well as formulate a national water policy. It took over the role for planning and developing water resources from the Ministry of Agriculture and Irrigation (MAI). The NWRA was in theory more powerful than the MAI as it was in charge of overseeing "all of Yemen's water resources and set policy that would help conserve and sustain them" (Caton 2007: 9). However, the MAI was still in charge of irrigation, planning, monitoring and development (Yehya & Al-Asbahi 2005: 5), and as irrigation water constitutes more than 90 per cent of the water used (Zeitoun et al. 2012: 58) they were effectively responsible for the resource.

In 2003 the Ministry of Water and Environment (MWE) was created, which was to oversee and guide NWRAs activities. It is the body in charge of coordinating and reorganizing the water sector and laying the institutional foundation for IWRM (Gerhager and Sahooly 2009: 35). Its creation, according to Al-Harithi (2009: para. 2), "reflected a political awareness in the water sector as a whole". However, the creation of the ministry seems not to have reflected any unity in the entire sector. According to Zeitoun et al. (2012: 57) the MWE is weak, dependent on donor financing from the World Bank and Dutch government, and unable

to implement rules and bargain effectively with the other well established ministries. While the MWE was originally suggested to be placed above the other ministries, thus in effect in control of all aspects of the water resources, it was in the end made a ministry at the same level as the powerful MAI (Caton 2007: 10). Other examples of a different approach to water resources are the Yemeni Water Law of 2002 and the National Water Sector Strategy and Investment Plan (NWSSIP) of 2004. For anything not stipulated in the Water Law, the civil law and the Islamic law apply (Water Law 2002: art. 80).

7.1.1 The Water Law

Yemen's Water Law was a long time in the making. According to Vincent (1999: 201) the government was wary of putting its legitimacy on the line by making rules it could not enforce, or by giving priority to one group over another. Although practically finished ten years earlier (Kohler 2000: 170) the law was not approved until 2002 because the concerned parties could not agree on which sector should have priority (after domestic use). Each time a new draft was proposed it would favour one group over the other and was consequently voted down by those who felt left out (Kohler 2000: 171). In the end however, *Law No. 33 of the year 2002 Concerning Water* was issued in 2002 and was later amended in 2006[6].

The Water Law grants NWRA a considerable amount of power and responsibility. According to article 12 of the law, NWRA is responsible for "estimating the water budgets, evaluating demand of water and the quantities that maybe exploited by the sectors that utilize water" (Water Law 2002: art. 12). Not only are they responsible for the surveys for this, but they are also to control (although not enforce) that for example the MAI does not use more water than it should. In addition, NWRA is also supposed to "insure [sic.] equity in benefiting from the available waters and the protection thereof from depletion and pollution" (Water Law 2002: art. 12). To build any kind of structure to capture water, dig or deepen a well, both government institutions as well as private persons have to get an approval from NWRA (Water Law 2006: art. 35). According to article 15, NWRA is also to approve all the water project plans of other government authorities (Water Law 2006: art. 15).

It is the MWE that is supposed to "draw up the principles of general water planning" (Water Law 2006: art. 13) so it is with them the power lies to weigh needs against resources.

[6] Because the translation of the amendments from 2006 only includes the amended articles I have referred to the original law from 2002 for those that are unchanged.

According to article 25, the MAI seems in theory to be subordinate to MWE when it comes to regarding the resource as a whole (Water Law 2006: art. 25). While the MAI is to prepare policies on use of water for irrigation and the like, they are to do this to get the most out of "*the agricultural sector's share* from water" (my italics). In other words the MWE, or in this case NWRA, decides what the MAI has to work with, and then the MAI only administers that. Presumably the share that MAI receives would be based on conservation of water and environmental protection which is the MWE's responsibility. However, as the current share of the (MAI) is in reality 93 per cent of the water (Zeitoun et al. 2012: 58), the MAI is effectively in charge of the resource as a whole.

7.1.2 NWSSIP

The National Water Sector Strategy and Investment Plan (NWSSIP) was created by the Ministry of Water and Environment (MWE) for the period 2005-2009, and then updated in 2010. According to the government this was "a multi-stakeholder process of preparing a consolidated strategy, action plan and investment program for the water sector as a whole" (RoY 2004: xi). The MWE are to manage water according to the NWSSIP (Al-Harithi 2009). Which along with its update is the main policy instrument of the MWE (Zeitoun et al. 2012: 57). The NWSSIP is based on Yemen's guiding principles for water policy which are the ones navigating the reform of the water sector (RoY 2004: 17). The principles are listed below:

Table 4: Guiding Principles for Yemen's Water Policy

Principles of good natural resource management • Integrated water resource management and the basin management approach. • Management of the resource for achieving efficiency and sustainability. *Social and economic principles* • Priority to domestic uses, with due consideration to equity and poverty aspects. • Allocative efficiency, so that water can flow to the use that pays the highest return, respecting basic domestic water needs for the poor. • Water supply concerns are to be balanced by demand management measures, including the use of economic incentives to reduce the demand. • Enhancing national and household food security through market-driven growth rather than self-sufficiency. • Fiscal, agricultural and trade policies to be factored into water sector policy. *Institutional principles* • Water sector governance and capacity building are considered a priority. • Decentralization, participation and user organization are key policy principles. • Role of the private sector is emphasized. • Role of the public sector in financing is clearly defined. • Regulatory function is separated from service delivery.

(RoY 2004: 18)

The struggle between the ministries also played a role in the first version of the NWSSIP. The Ministry of Irrigation and Agriculture (MAI) criticized the MWE for trying to take power away from them, and the original NWSSIP lacked support because it ignored the MAI, for example provoking the ministry by granting it a very small part of the NWSSIP budget even though it controls nearly all the water (93 per cent) (Zeitoun et al. 2012: 58).

7.1.3 Water as an Economic Good

Concerning water as an economic good, we remember the two different schools of thought presented in the chapter on theoretical perspectives. In terms of the first school, ownership, prices and a market were central. These were also tools within the second school of thought, but here a broader consideration of what was beneficial was seen to be the best way to determine what water should be used for.

The Water Law does not specify direct fees for water except for commercial purposes (Water Law 2006: art. 76). Significantly, water for agricultural purposes is not considered commercial use (Water Law 2002: art. 8 § 29). Otherwise, fees in relation to water use are fees for registration of water rights, fees for protecting water from contamination from sewerage, industrial or commercial waste (Water Law 2006: art. 76). Article 77 of the Water Law stipulates that the fees are to be collected by NWRA and used for the running of NWRA; any other fees collected by other entities go to support them (Water Law 2002: art. 77).

The NWSSIP also mentions pricing as a possibility to change the current incentive structure (RoY 2004: 22). It stipulates that "In collaboration with stakeholders, the government would help put in place a system of water rights" (RoY 2004: 26). It is however the government that holds the ultimate control. According to article 6 of the Water Law one cannot exploit groundwater unless one has a permit, and these permits are distributed from the government.

It seems an ultimate goal is creating a market for trading water rights. According to the NWSSIP "the MWE would work (long term) on defining and gaining social and political acceptance of a system of water rights that would allow recognition of formalized water markets and trade in water rights" (RoY 2004: 26). According to the first school of thought as it was explained by Briscoe (1996) one sought a market where one could trade water rights, priced according to use cost and through the trade by opportunity cost. Whether a market for trading water rights would work the wanted way in Yemen is not certain. First of all, there is

the question of whether these rights would reflect the use cost to begin with, and secondly the recognition of tradition water rights could leave some people with a great deal of water and some with very little. The Water Law maintains that traditional water rights in existence before the law "shall remain reserved without prejudice to the registration principles" (Water Law 2006: art. 29). This could potentially be difficult as Yemen is allegedly full of such traditional rights. In an evaluation of the Water Law for the GTZ (Deutsche Gesellschaft für Technische Zusammenarbeit) Richards writes that "Given the strong vested interests of the holders of traditional and common water rights, particularly for irrigation purposes, it is perhaps not surprising that the Water Law is weak in the areas of water being an economic good, ownership, and equity in resource allocation" (2002: 8). Those who end up with very little might then have difficulty entering the market, and those with a lot of water could continue using it even though there existed an economically better way of using it. Therefore, it is hard to say if this market is to function according to the first school where it determines the value of water or according to the second school where it helps distribute water to predefined "high value uses". School two focused on the "best" use of water in a larger societal context, in other words, water should be regulated and not dictated by the market. The NWSSIP stresses the importance of the macroeconomic policy on water resources, and the need to link the two (RoY 2004: 26). It stipulates that dealing with the problem of unsustainable groundwater abstraction will have to happen through economic incentives such as trade and policy measures within agriculture, clearly defined and assigned water use rights, as well as technology to let farmers make more money from less water (RoY 2004: 22).

Article 17 of the Water Law talks about the "control and monitoring measures that will ensure the efficient and rational use of water" (Water Law 2002: art. 17 § 2), measure that are to be included in the water plans made by NWRA. It is unclear whether pricing is one of the "control measures" mentioned here. In any case, the government seems to be thinking beyond economic value, as it faces the ironic problem of too little water being used in many places, as the NWSSIP states "the goal for rural water is to achieve rapid expansion of water and sanitation services" (RoY 2004: 32). These two goals seem slightly contradictory, although as Savenije and Van der Zaag (2009: 100) claim: "demand management may also include measures aimed at stimulating water demand". The hope is perhaps that technology will be able to bridge the gap and still help bring water use down.

Within the irrigated agriculture sector, the NWSSIP focuses on measures to increase efficiency of water use, and also to spread this to several areas (RoY 2004: 37). Article 25 of the Water Law states that the MWE is supposed to increase productivity and encourage technological solutions to achieve more what one might call "crop per drop" (Water Law 2006: art. 25 § 2). The NWSSIP envisions a system where people should have many different technologies to choose from and they should know what each method will cost them and what the sustainability implication of each is (RoY 2004: 34). However, it does not mention how they expect people with limited means to choose what might be a more environmentally sustainable, but possibly more expensive, option.

As the Water Law states that "water is a right that is accessible to all" (Water Law 2002: art. 4), no ownership, such as by the state, is actually defined (Richards 2002: 8). However, anyone who uses it would in theory need a permit obtainable from the state. Article 5 of the Water Law states that "watercourses in the *wadis* are property in common to all the beneficiaries" (Water Law 2002: art. 5), addressing ownership to a greater extent, but without saying how this is to be divided if permits were required for water use here. Instead it only mentions that the water wells and installations set up by the government are subject to fees, but does not specify if this is based on operation and maintenance of the structures or the use of the water. Water for drinking and domestic use has absolute priority according to article 20 of the Water Law, and is as mentioned, not subject to fees (Water Law 2002: art. 20). This is in line with the claim of the second school of thought that because water is a special type of commodity it does not "behave" the same way other commodities do. Because people will always need some water, a higher price will not be likely to do anything with this demand.

7.1.4 Participation

The element "participation" features clearly in the Water Law. Article 10 for example, states that "Water users and beneficiaries associations, groups, committees, leagues, or federations may be formed for the purpose of involving the public and the beneficiaries of water in regulating water resources or in operation and maintenance of water installations"(Water Law 2002: art. 10). In this article two things are particularly interesting. First of all, the various groups are not a necessary part of the regulation (they *may* be formed), it is however interesting to note that when they are formed, the point is to involve the public and beneficiaries in the regulation, as opposed to simply outsourcing the work.

In terms of what one regards as the point of participation, article 3 of the Water Law states that the purpose of the law is to target "stakeholders in the management of water facilities at the stages of their development, investment, protection and maintenance" (Water Law 2006: art. 3). Here there is little focus on participants deciding *what* should happen, and can therefore be interpreted as a more pragmatic than normative approach. For example, NWRA is charged with grouping basins that it considers to be in a similar situation, together so that they can be placed "under uniform standard procedures" (Water Law 2002: art. 14).

Article 18 mentions enhancing decentralization and participation at the level of basins. One way this is to be carried out is through the division of the country into water basins or zones and the setting up of committees in these. The law stipulates that Yemen is to "be divided into Water Basins and Water Zones" (Water Law 2002: art. 8), which are according to be autonomous; the MWE is to set up water basin committees in these (Water Law 2006: art. 11). According to Kemper et al. (2007) clear institutional boundaries which match the basins is an advantage. However, this might affect the possibility of participation depending on how boundaries suit various social groups.

As pointed out by Kemper et al. (2007), one thing is the claim to decentralize; another is whether it is actually done. There are several institutions in place in Yemen today to make participation through decentralization possible. Already in 1996, Yemen had focused its local administration law according to a pro-decentralization policy (Gerhager and Sahooly 2009: 31). In 2008, 961 Water User Groups (WUGs) had been created and these were organized into 100 Water User Associations (WUAs) (Hübschen 2010: 104). The tasks of these WUAs are to provide irrigation services, perform maintenance, collect fees, and develop self-reliant operation and maintenance systems. There are also Irrigation Councils (ICs) which function as a connection between the government authorities and the WUAs, with representation both from the local authorities and the MAI, as well as the WUAs (Abu-Hatim & Mohamed 2009: 370-371). According to Hübschen (2010: 104), the WUAs give the opportunity to receive help from the government or international developing organizations. They also create a place where one can create one's own rules for example well drilling.

The government seems to play a leading role, both according to the Water Law and the NWSSIP when it comes to participation. The government's role is to "create an enabling institutional framework", provide information and raise awareness and create a vision among

users of a shared resource, supply infrastructure, and protect water rights and implement the law and create good economic incentives (RoY 2004: 24). While there is focus on decentralization and participation, this seems to a large extent to happen within the scope or plan of the government. The NWSSIP makes it clear that "the government has to play a leading role" (RoY 2004: 23) because of the severity of the situation. At the same time they wish to avoid imposing top-down decisions or replacing customary and indigenous institutions and laws (RoY 2004: 23). Instead, they seek a partnership with these institutions which "have been proven effective in regulating water use and ensuring sustainability" in the past (RoY 2004: 23). In order for this to be done, stakeholders should both share their knowledge and be a part of deciding what issues they have with water resources, and later implement plans and monitor (RoY 2004: 23-24). As the participants are supposed to be the ones who define the problem, this could be seen as empowerment. It is however the government that "has to assume the role of a catalyst for creation of such [community based] organizations and for building their capacities" (RoY 2004: 24).

The NWSSIP focuses on "the creation of a shared vision among stakeholders to guide water resources management efforts" (RoY 2004: 24). The way of achieving this is to formulate water resource management plans through a participatory approach (RoY 2004: 24-25). While this sounds like participation focused on empowerment, they also say that information and solutions "generated by water professionals would be disseminated among stakeholders who would be involved in the selection of water management strategies to be implemented" (RoY 2004: 25). So here the participants are choosing from something already determined, not deciding. On the other hand, the NWSSIP also states that "work through community based organizations be adopted as standard practice for identifying projects to implement" (RoY 2004: 34). Furthermore, they also focus on strengthening the local community's capacity (RoY 2004: 34); both of which sound like empowerment is in focus. The state is also supposed to encourage participation in management and conservation of water resources (Water Law 2006: art 48 § 3 & 4). This could potentially be problematic, or at least has some bearing on what type of participation one can have, because unless you have a type of participation where the state makes the decisions, it is not guaranteed that one will have conservation of water resources, and conversely if one ensures conservation, it limits the extent to which one can have empowering participation.

7.1.5 A new Water Ethic

In its current situation Yemen is forced to deal with two very conflicting problems: trying to lower the over-abstraction of water, but also supplying more water for a number of purposes such as health and development. This predicament is reflected in the Water Law and in the NWSSIP.

The NWSSIP states that objectives on a human level "are to ensure equitable access to water and efficient use. At the environmental level, the objectives are to ensure resource sustainability both in quantity and quality" (RoY 2004: 40). Does this mean that first one attends to equity and efficiency and then considers the environmental issues, or the other way around? Article 2 of the Water Law defines "water planning" as assessing information on the water situation "in light of […] national development needs for water" (Water Law 2002: art. 2 § 4). In other words it sounds like the first priority is development; first one decides what one needs, then one checks what one has. However, the definition goes on to say that one is to select the alternative for managing water "in the best possible way" and also "to lead to the sustainability of water resources", seemingly putting protection of the resource first, more in line with the new paradigm of understanding water. The environment itself occupies a small place in the NWSSIP, perhaps not surprisingly with basic human needs to cover such as health, nutrition and poverty alleviation. The human and environmental aspects of the NWSSIP are first and foremost human based. They are about protecting the environment in order to protect people "preventing environmental degradation to avoid its profound negative impact on poverty" (RoY 2004: xiv). In other words what Armstrong would call a consequentialist, or a utilitarian ethical approach. The NWSSIP also makes it clear what the reality faced in Yemen is in the sentence "As sustainability is no longer attainable in the overexploited areas, and as some mining is unavoidable, NWRA will also propose a "rational groundwater policy" (RoY 2004: 22). The Water Law somewhat confusingly states that NWRA is to draw up water plans for the basins which estimate demand "in a manner that ensures the sustainability of water resources" (Water Law 2002: art. 17 § 2). The Water Law also mentions ensuring conservation of water and protection of the environment (Water Law 2002: art. 17 § 6), and even mentions the environment as a receiver of water, stressing that one must secure "the minimal limits to meet environmental requirements" (Water Law 2002: art. 21). On the other hand the NWSSIP states that "Yemen needs a system of water and

environmental rights" (RoY 2004: 25). The NWSSIP also proposes some objectives that seem to focus on the resource itself. The objectives focus first on ensuring "maximum possible degree of sustainability", then on priority to domestic needs, and only then: "thereafter, maximize economic benefits through improved allocation, while mindful of equity and social norms" (RoY 2004: 23). The last two objectives are: "create a realistic and holistic vision among the general population regarding water resources availability/scarcity" and to "contribute to poverty alleviation by promoting efficient use and equity in water allocation, so as to enhance socio-economic development" (RoY 2004: 23). The first seems to follow Harremoës' point that an ethic can be used to regulate water use, and can be changed over time. The last part here might be problematic though. If one is to promote equity and efficient use *while* ensuring maximum sustainability, apart from what could be gained with improved efficiency this would necessarily have to mean taking water from someone and redistributing it. This could be highly unpopular and potentially disrupt any participatory or decentralization possibilities, as one might lose the cooperation of those who would lose their water.

In the water law, wasting water is defined as both the intentional but also the negligent causing of losses of *quantities* of water (Water Law 2006: art 2 § 30). While wasting in itself need not be a bad thing and a statement such as this could be interpreted as an intrinsic view on water, Yemen is already experiencing such severe water shortage that the case is different. Article 6 is almost a direct quote of the consequentialist position mentioned by Armstrong (2006): "All beneficiaries of any of the water resources shall enjoy the right to benefit from this resource, in such a way as not to harm the interest of other beneficiaries" (Water Law 2002: art. 6). The Water Law aims to regulate, develop and ration the exploitation of water resources in addition to protecting the resources from depletion or from pollution (Water Law 2006: art. 3). Although exploitation of such an already depleted resource might seem difficult to unite with protection – they certainly aim for it. However in the amendment it is slightly different targeting "the organization, management, development, and rationalizing of the use of water resources and protecting it from depletion and pollution" increasing efficiency and involving stakeholders.

With regard to Armstrong's (2006) four ethical positions, one could say that the Government of Yemen's approach to the element "a new water ethic" is torn between the utilitarian, the consequentialist and the intrinsic position. It to a large degree focuses on water as a resource

for people, taking into account the environment, but doing so largely to serve society. The focus on sustainability could both be seen as consequentialist and intrinsic, either as protecting the long term use of humans, or as protection of it source for its own sake. Although, not surprising for a country in Yemen's position, neither the law nor the NWSSIP focuses on leaving water undisturbed, or in the best state for the hydrological cycle, as prescribed by Armstrong's (2009) rules of thumb.

7.2 Realities for IWRM

Having seen how the three chosen elements of IWRM are approached by the Government of Yemen (GoY), specifically in the Water Law and the NWSSIP I turn now to the context in Yemen and to what extent it allows the various stipulations to unfold.

7.2.1 Difficulties from Within and from Without the Government

Yemen's Water Law gives IWRM a central place referring to it as "basis for the organization and management of water resources in Yemen" (Hübschen 2010: 104). However, representatives from the Yemeni water sector feel there is really no proper focus on integration as the focus is still on delivering drinking water and ensuring reliable water supply (Hübschen 2010: 104). The NWRA is given the difficult role, in a country where the resources are fully developed, to "ensure in the quantity of water required and [at the same time] in ensuring source protection from depletion" (RoY 2004: 34).

According to the Water Law, the state is supposed to encourage technological solutions that aim to save water supply while at the same time increasing agricultural yield (Water Law 2006: art. 48 § 1). Already two decades ago, it was noted that agricultural expansion in Yemen could only be discussed after great changes to conserve water had been introduced (Sadik & Barghouti 1995: 5). Not only does the country have to balance between these potentially opposite goals, but there is also the problem of getting farmers to use improved irrigation technology (Hellegers et al. 2008: 54). A mentioned earlier, the MAI has lobbied heavily to keep irrigation a separate sector (Hübschen 2010: 215).

One reality affecting the approach to IWRM in Yemen is the set up and the interest of the different ministries. Dasgupta et al. (2009: 384) claim that the water sector agencies in Yemen are "comparatively streamlined" with organs such as the National Water Resources Agency

(NWRA), the General Authority for Rural Water Supply Projects (GARWSP), the National Water and Sanitation Authority (NWSA), the Technical Secretariat for Water Supply and Sanitation Sector Reform, as well as the Environmental Protection Authority, organized under the Ministry of Water and Environment. Hübschen (2010) on the other hand claims that the water sector is fragmented, that there is lack of cooperation between and within sectors and that this makes plans difficult. NWRA has no leverage over the irrigation agriculture, because it is placed under the MWE on the same line as GARWSP and NWSA and not on the same level as the MAI. Even the MWE has limited leverage over irrigation water. While the MWE is to "be responsible for investment planning for the entire water sector" this is *excluding* irrigation according to the NWSSIP (RoY 2004: 20). Hübschen (2010: 215) points out that while NWRA exists "to implement an integrated management of water resources", it does not have the power or human capacity to do so, in addition to lacking the autonomy needed. One would have to increase the power of NWRA and Hübschen suggests subordinate it to the prime ministry instead of the MWE (Hübschen 2010: 215-216). According to the former deputy minister of MWE, the problem is that there is no coherent public administrative system in Yemen. Instead efforts are made here and there (Hübschen 2010: 99).

Not only does NWRA have limited power over other parts of the government, it is also limited in its ability to enforce the rules it does set. In the *Sanaa* basin in 2007 for example, only two of in total 141 reports of illegally drilled wells were prosecuted (Moore 2011: 45). Tellingly the Water Law stipulate that police and security personnel shall support NWRA when necessary (Water Law 2002: art. 63), and that NWRA is responsible among other things for any bodily harm incurred by an inspector or a water beneficiary (Water Law 2002: art. 66).

Possibly an indication of how powerful the farming sector is, is the fact that president *Saleh* stopped the merging of the MWE and the MAI in 2002 (Hübschen 2010: 113). Hübschen sees the limited power of NWRA as problematic because it is the job of NWRA to promote IWRM which "theoretically should be the overarching concept" (2010: 100).

According to Ward (2009: 240) the "regulatory approaches" with the water law and the establishment of NWRA have had limited success, except for the ability of NWRA to mediate especially in non-tribal areas (Ward 2009: 240). Many of the measures dictated by the Water Law, such as licenses, water rights, and control; are for the time being "generally beyond the

capability of the Yemeni administration to implement" (Ward 2009: 236). Because many rural areas are under tribal rule to a greater extent than they are the central government, being able to establish a system for tradable water rights is hampered simply by establishing the water rights in the first place (Hellegers et al. 2008: 45). As we know there old and widespread systems of water rights in Yemen, the authors are presumably referring to a new system of water rights in line with a conservation policy. As they put it: "establishing [water] rights at levels that make significant contributions to the sustainability of water use" (Hellegers et al. 2008: 45).

Because state and tribal relations are not the best, the state drove the tribes in groundwater abstraction. For example, when the state built dams, this caused tribal people downstream of the dams to dig wells. Also the wish not to be dependent on food, made some tribes dug wells. He also mentions how one irrigated land in order to be sure that the government did not seize it as unproductive land (Moore 2011: 44). The wells also became a source of income as one could charge people to use them, and strengthened or created rural elite persons (Moore 2011: 44-45).

In general it seems the government is not easily able to run a decentralization process. "Despite a decentralization program for cost-sharing in water investment programs, government remains the dominant financier" (Abu-Hatim & Mohamed 2009: 369). The MAI also struggles with decentralisation (Hübschen 2010: 106). Local branches lack funding and aspects such as financing and staffing are still centralized, as well as people having difficulty in adjusting to the new system. Even though it has offices in all of the governorates, the MAI is still very centralized when it comes to decision-making (Hübschen 2010: 106). There is also a lack of institutional capacity and human resources especially in terms of integrated thinking, and of financial capacity both in NWRA and the Local Councils (Hübschen 2010: 115).

7.2.2 Solution is in the society

Hübschen (2010) sees decentralization as a viable solution in Yemen due to the Yemeni society and governance system. "Decentralized water governance is presently already attempted in the district of *Amran* and could serve as an example for an integrated management of water resources in the rest of the country if applied successfully" (Hübschen 2010, 220). Even the government recognizes that "cooperative management approaches" have

a larger chance of success because of the "weak formal institutional structures" (Hübschen 2010: 219). Quoting Ward et al. (2000) she explains that "self-management and self-regulation will be at the heart of a solution to Yemen's water resources management crisis" (Hübschen 2010: 219).

Moore (2011: 46) claims there is an institutional vacuum where nothing new is being implemented. It is also questionable who has the capacity to establish water rights which ensure protection of the resource. Because of the context in Yemen were local leaders often are more important than the state, opinions among people matter a lot (Hellegers et al. 2008: 60). Negenman (1997: 71) gives one example when there was a discovery of a new water resource that the government tried to take possession of, but was unable to because of the locals who disagree on benefits and rights. In rural areas the state's decisions can be far less important than those from a tribe or a clan (Hellegers et al. 2008: 45). A large proportion of the population (29, 35, and 62 per cent in *Sanaa*, *Ta'iz* and *Hadramawt* respectively) does not even know what institution was in charge of well license (Hellegers et al. 2008).

While local enforcement of rules within a community might be successful, the government also realizes the equity issues here where large farmers can control a Water User Association (WUA) or refuse to join it (Hübschen 2010: 219-220). The informal traditional governance systems which Hübschen mentions first as the solution in Yemen, can also be seen as a hindrance, or at least as an obstacle to just going directly for a centrally conceived of decentralized approach to IWRM, because of the strong loyalties and systems already in place. "It is therefore suggested to increasingly utilize prevailing informal structures for effective water governance in Yemen" (Hübschen 2010: 220). Local informal ways of managing water are seen as a possible solution and the Yemeni government is trying to map and use such traditions (Hübschen 2010: 220-221). The water law mentions respecting traditional rights. Those who have these are not required to obtain a permit, but must register their rights within three years of a set date (Water Law 2002: art. 32). This however, raises the question of what to do if these systems are part of the problem, for example causing water depletion.

There is evidence that Water User Associations (WUAs) as a decentralization measure are working in Yemen. Dasgupta et al. found in their study that although it was too early to say what the role of the WUAs and the Irrigation Councils (ICs) is so far and how much irrigation

service they are able to provide in relation to what was there before, the WUAs had been "established and become fully operational with active boards of directors, proper bookkeeping, and bank accounts" and that the ICs had begun discussing issues on water rights and distribution (Dasgupta et al. 2009: 374-375).

There are several potential problems related to the WUAs. Hübschen (2010) reports that too many are created too quickly, and are not able to take on the tasks they are given or continue working independently once they are established. Furthermore, they run the risk of being co-opted by powerful farmers to support their interest, or that the same farmers boycott the entire process (Hübschen 2010: 104). Dasgupta et al. explain from their research in Yemen that farmers were first reluctant to join the WUAs and share in the cost of the projects because they felt little incentive as they were used to centralized subsidies and were unsure of what they would get in return as spate water is unpredictable (2009: 372). However, the authors explain that through the awareness campaign of the project interest increased and WUAs were formed as the farmers realized this meant they could participate and make decisions (Dasgupta et al. 2009: 372). The authors further go on to say that farmers were increasingly willing to participate and share the costs of farm improvement as they saw that it increased yields (Dasgupta et al. 2009: 372). But what if the water resource is already over exploited? There are limits to what can be increased, even if technological or infrastructural improvements could perhaps give more "crop per drop", in places where the rate of over abstraction is already high, yields might have to go down, at least for some of the people involved.

Furthermore, applying traditional rules might not be straight forward. Ward tells an interesting story from *Wadi Al-Jawf* where the World Bank ran a project based on the logic of old rules and divided the water amongst the users, giving people the equivalent amount they would have received based on the traditional division, which was based on season (Ward 2009:242). The project was a failure because the people who received the lesser amount were unhappy with the deal and attacked the contractor effectively ending the project; despite having agreed with the division which in theory left them no worse off. What the specific reason for this was is unknown to the authors; however it serves to illustrate the potential difficulties of trying to copy existing systems into new situations.

Another question is whether the reality facing Yemen is that while it is difficult for a central government, measures locally might not be the easiest to get through either. While there has been much focus on Yemen's traditional past of managing water—which by all means is impressive—the extent to which this traditional heritage is applicable or of help in today's situation, I would argue is limited. Moore explains the situation in Yemen as that of technological advances of the 1900s which have "outpaced" the local institutions. While there used to be groundwater laws which was well adapted to the available technologies, when all of a sudden one had a new technology not covered by the laws (2011, 45). As explained in the context chapter on Yemen, the technology boom in Yemen in the 70s can absolutely be said to have been detrimental to Yemen's water supply situation. However, the idea that technology has outpaced traditional management is in my opinion somewhat misleading. The traditional laws governing water were in place to share what little there was, so with the availability of more water there was simply more to share. After all, Yemen today has more water, not less. The over-pumping of groundwater mainly has two vices: while there is more water for some this can mean less for others—like in *Al-Mujaylis*—and that there will be less water in the future for the people who have depended on it. While the traditional rules have been concerned with a sense of equity for people, there was little need to focus on long term sustainability as the water sources ensured this themselves. The springs, the spate water and the shallow groundwater all depend on relatively recent rainfall, and are in that way self-regulating (Hellegers et al. 2008: 36).

Lichtenthäler also mentions how "Until the early 1970s, traditional practices ensured a balance between supply and demand" (2010). However, I again would say it was the supply that ensured the balance. As the specific rules which ensured landowners the water they needed for their crops also came under challenge as population grew Lichtenthäler (2000) showed how these were mediated and changed, but they were always about finding ways to share what there was. Lichenthäler's case also shows the potential challenge of population growth to older systems. According to Negenman (1997: 71), because water is seen as God's gift, it is hard to persuade people that they should not use it.

The power of the traditional management matters in terms of participation. According to the NWSSIP, the government does not want water management conducted in a top-down style. Instead, they want a partnership with institutions that have been effective and sustainable in

the past (RoY 2004: 23). While it might be desirable for the government to avoid top-down management due to ideals of participation as well as the limited ability of the central government to enforce rules in the periphery it is by no means certain that the institutions which ensured sustainable water management in the past are able to do so today. While it is true that there have been very many impressive adjustments at least in Yemen and probably in the region, these adjustments have been by and large about how to use what little there is. Conserving water for the future is about leaving what little water there is.

7.3 Summing Up

This chapter has shown how the Government of Yemen approaches the three chosen elements of IWRM, and how the contextual realities in the country affect that approach. The first element "water as an economic good", is mainly dealt with by the government in terms of setting up water market where water rights can be traded. However, they also aim to recognise traditional and previous ownership which puts them in a difficult situation as most water is already being used. Concerning "participation" the government aim to involve users and to decentralize water management, but are lacking in capacity to do so. The water ethic perceivable in the law and policy documents studied is in many ways similar to the "new water ethic" of IWRM but also suffers under the difficult water conditions Yemen is facing, and is also faced by traditional management which does not seem to agree with "a new water ethic".

8 Stage IV – Making it Work

This chapter looks at the approach to IWRM in *Wadi Zabid*. The previous chapters have presented and explained IWRM as well as the three elements of the concept I have chosen to investigate: "water as an economic good", "participation", and "a new water ethic". I have shown how these elements are approached by the Global Water Partnership (GWP), and by the Government of Yemen. In this chapter I turn to the farmers of *Wadi Zabid*, and investigate how they approach these three elements of IWRM. The chapter is divided into two main sections. In section 8.1 I give a short presentation of *Wadi Zabid*, the area where the data is gathered from, including natural features, history of water management, modern water projects, and current water related problems. In section 8.2, I begin mapping the potential for IWRM in *Wadi Zabid* by investigate how the three elements are interpreted and approached by the respondents there. I will sum up the findings from *Wadi Zabid*, in the final chapter.

8.1 *Wadi Zabid* – Setting the Scene

Wadi Zabid is an area in the *Hudayda* governorate, on the Red Sea coast of Yemen. The *wadi*, or riverbed, descends westward from the mountain range further inland, until it reaches the *Tihama* Coastal Plain. Here the water flows in moderate amounts throughout the year (Bahamish 2004: 5). The *wadi* floods between March and October.

The population in *Wadi Zabid*, counting those who rely on the irrigation system from the *wadi*, is about 90,000 divided in 127 villages. The absolute majority of the villages are small with less than 1,000 inhabitants (Bahamish 2004: 5). In 2004, the sources for irrigation were divided: 60 per cent was water from the *wadi* (spate and base-flow), 20 per cent was from rain, and 20 per cent from groundwater (Bahamish 2004: 5). Possibly, groundwater covers a larger per cent today, as many of the respondents reported less rain and spate. Some respondents in my study reported that the groundwater was dropping, and one farmer said this had led to a decrease in the area possible to cultivate for agriculture. The spate water, the flood water in the *wadi*, is diverted from one of the main canals by building a temporary earthen structure which guides the water into the correct field. Spate water is either used for pre-planting irrigation for field crops (Bahamish 2004: 10) or for bananas.

8.1.1 *Sheikh Al-Gabarti*'s ruling

Like water in general in Yemen, the water that flows in a *wadi* does not belong to any person. However when it is diverted into a canal, it belongs to the people who use the water in that canal to irrigate (Bahamish 2004: 8). The system for dividing the spate water in *Wadi Zabid* is the very old and well established *Al-Gabarti* ruling. This goes back to the sheikh *Ismai'l Al-Gabarti* who died 877 *higera* and who modified the system to account for the current problems and wishes in the *wadi*. The new rule divided the *wadi* into three groups (Bahamish 2004: 8). Before this the usual al-ala-fal-ala system prevailed. Modifying the principle of the *Al 'ala fa al 'ala* (roughly translated to "those furthest up first") where those upstream had the first right to water, he divided the *wadi* into three groups allotting each the water of one specific time period. The upper riparians (the group furthest upstream) were given most of the water. They were entitled to the first 127 days of the flood period, as well as the base-flow – the water in the *wadi* the rest of the year outside the flood period. The second group were entitled to the water the next 42 days of the flood period, and the third group, furthest downstream, received water for 35 days. This left four days of unallocated water which was given to a family outside of the groups, further downstream. It was upheld, first by the Imam of Yemen, about 400 years after it was made, and as late as 50 years ago (Tipton & Kalambach 1974: 12). In other words, except the last four days, all of the flood water was distributed to the three groups. This did not mean however, that all the water was *used* by these farmers.

The *Al-Gabarti* ruling, established hundreds of years ago, still has a high standing in *Wadi Zabid*. "The system we follow for spate water distribution is that of *Al-Gabarti* which has been in place for over 850 years" said one of the sheikhs of one of the canals. The *Al-Gabarti* system, although recognising the rights of all three groups, still favours those upstream in the *wadi* relative to those downstream. According to Merabet (1980: 48) the "water rights system in *Wadi Zabid* is unique among those practiced in Yemen because instead of using the "upstream right" principle, it has a system based on a time schedule".

The group division is Group I (weir 1 and 2) 18th Oct – 2nd Aug. Group II (weir 3 and 4) 3rd Aug – 13th Sep and Group III (weir 5) 14th Sep – 18th Oct (Bahamish 2004: 6). Group I in the Upper *wadi* consists of the canals of *Buni*, *Bari* and *Jerbah*, *Mansouri*, *Rayan* and *Bogr*; Group II in the middle *wadi* consists of *Mawi*, *Youssifi*, *Wadi Nassri*, *Ebri*, *Jerhazi*, *Birah* and

Greeb, and Group III in the lower *wadi* consists of Shara'abi, *Haram* and *Wadi Ain* (Bahamish 2004: 8). According to Bahamish (2004: 8) the flood period is divided as follows: Upper *wadi* gets water for 97 days (16 March – 20 July), the middle *wadi* for 40 days where floods are usually frequent (21st July – 31st of August), and the lower *wadi* gets water the remaining 35 days (1st September – 5th October) (Bahamish 2004: 8). There are rules against watering more than once in a 14 day period, or to add new land to the command area (Bahamish 2004: 6). What belongs to which canal is clearly defined, so one knows if this is exceeded (Bahamish 2004: 8-9). According to Bahamish (2004: 8-10), the *Al 'ala fa al 'ala* rule applies within these groupings so that within one group the first or highest weir is the one to take water first.

8.1.2 Development of the *Wadi*

In the 60s, internationally funded research was concerned with how one could develop agriculture in *Wadi Zabid* (Merabet 1980: 45). They found that there was little groundwater in the area, and improvement this way would not yield much, "therefore the plan to increase the irrigated area by increasing groundwater abstraction was abandoned" (Merabet 1980: 46). Instead, one decided to use the surface water and already existing structures, reconstructing the canals and building 10 diversion weirs. For economic reasons the numbers were reduced to five weirs (Merabet 1980:47), which was to affect the distribution radically.

The system in the *wadi* was "modernized" or re-constructed in 1980, after which agriculture increased. Because of the good price the crop fetched, banana plantations increased substantially (Bahamish 2004: 5). The development of the irrigation scheme was done in 1978 and the organisation *Tihama* Development Authority (TDA) was responsible for allocation and problems related to management (Bahamish 2004: 6). The TDA was created in 1973 and was under what was then the Ministry of Agriculture (MOA) (which is now the Ministry of Agriculture and Irrigation (MAI). TDA had the responsibility for managing and developing water sources within its jurisdiction, as well as "studying, implementing, operating and maintaining all the development projects in the *Tehama* Plain" (Merabet 1980: 27-28).

While it might seem that a project like this belongs to what was I have previously presented as "the old paradigm" on water, it need not necessarily be so, as the constructions could keep water from running straight to the sea. As Al-Alawi and Abdulrazzak explain: "Increasing the

volume of groundwater recharge from surface runoff, especially for Saudi Arabia, Yemen and Oman, can provide additional water for times of need, since much surface runoff is now being lost to the sea from coastal drainage basins" (1995:196). Varisco (1990: 304) however criticises such projects in Yemen in general saying:

> "Several development projects in the YAR have directly or indirectly influenced existing allocation systems for irrigation [and] provided more water for some areas and less for others. These projects, concerned only with the construction aspects, have given little or no consideration to the confusion created in the communities involved. They have generated new legal disputes without significantly improving overall production from the increased water supply".

This seems at least in part to be the case in *Wadi Zabid* also.

8.1.3 Agriculture then and now

The respondents in *Wadi Zabid* explained that agriculture had changed over the past decades. A key informant from the TDA said that *Tihama* was responsible for 45 per cent of Yemen's agricultural income, and that before the mid-80s they farmed cereal in *Wadi Zabid*, but that now banana agriculture has largely taken over. In the upper parts of the *wadi*, the informant stated, it accounts for as much as 80 per cent of agriculture.

Many of the farmers in *Wadi Zabid* are experiencing a shortage of water, and in the coastal village *Al-Mujaylis* downstream of the *wadi*, the groundwater, which is believed to be fed from *Wadi Zabid*, has disappeared. In *Wadi Zabid* a farmer explained that banana plantations increased together with an increased number of wells. That while one before had relied on spate water mostly, one was increasingly using wells for irrigation, according to this farmer because of the new weirs. In general the farmers of *Wadi Zabid* reported both spate and well water as sources for their irrigation. A problem that was often reported was the proximity of these wells which were very close to each other. Another farmer said that agriculture was decreasing because there was less rain, and less groundwater. While there had been water at 21 metres depth in the 80s, the level had sunk to 45 - 50 metres, requiring them to double the depths of their wells.

One possible explanation for the decreasing spate water in *Wadi Zabid* is presented by Varisco (1991) who has documented the lack of maintenance on agricultural terraces - a specialized method of agriculture in the Yemeni highlands. When these terraces are not

maintained, the annual floods cause erosion which affects the entire *wadi* downstream. In *Wadi Zabid* it has not only caused land to be washed away, but also a build-up of sedimentation along the *wadi* and by the weirs which decrease the amount of water available for irrigation (Varisco 1991: 169).

Not only does there seem to be relatively less water in general, the distribution of water in the *wadi* has changed according to secondary sources and also many of the farmers interviewed in this study. The relatively new, concrete weirs were partly blamed for this. One farmer said that the new canals had changed the system of distribution and that before there had been enough water for all. The weirs stopped those downstream from getting water according to another farmer. As another farmer put it: "In the past people managed to water regularly, but now everyone wants the canal to himself". On the other hand, the weirs did not only mean that those upstream could control the water to a greater extent, as one farmer explained: "Yes, the weirs did change the traditional system, but before they were there, no one could control the flood". A farmer said that when the floods came before, they often destroyed the canals and the water would flow downstream. This was perhaps seen as negative by this particular farmer who is situated at the first weir in the *wadi*, but for farmers downstream this would of course mean that they had more access to water before. This particular farmer was also pleased with an Irrigation Improvement Project carried out in 2007, which had saved water, as he put it. He is probably here referring to the raising of two of the weirs (weir one and weir three) which were criticised by other farmers for depriving those at weir two and four of water.

One reason that the distribution in water had changed seemed to be that the crop type, especially upstream, had changed. Many of the farmers said the crop change had happened about 20 years ago. "Yes, it has changed after 1995; in some higher parts in the *wadi*, bananas now make up 85 per cent of the crop". We also remember that this is around the time Yemen imposed a fruit import ban, as part of their food self-sufficiency strategy. One respondent explained that "the crop changed from grains to bananas and mangoes after the weirs were constructed". The concrete weirs in the area were seen as having a big impact too, not only on the crop pattern, but on the flow of water in general. One of the key informants, a manager at a research farm at weir one, said that the agricultural area had increased in the *Tihama* in

general because spate water now watered additional areas, and they had technology which helped "pumping huge quantities of water". Another farmer noted that he knew there were problems of water in *Al-Mujaylis*, because water was stopped going there by the weirs: "Before when there were no weirs, we would not take all the water, and the excess water would flow to the sea".

The new weirs allow those upstream to keep the water there to a larger extent than they could with earthen weirs which would break explained one of the key informants, thus making a de facto change in water rights in the opinion of some of the farmers. Many farmers complained that those furthest up in *Wadi Zabid* were not only watering more often than what was allowed; they were also increasing the agricultural area – also prohibited by the *Al-Gabarti* ruling. One of the respondents said that with the help of technology one could now reach much further with the water, and he claimed that 70 per cent of the new waterways now go into land which before was not reached by the spate.

In the study that was carried out in 2004, they found that only 60-70 per cent of the farmers received the water they were entitled to. This was partly because some farmers watered more than they needed to, and also because of lacking maintenance to the canals. They also explained that contrary to the past, there was no-one in the *wadi* who now had the power to make sure the traditional rules were respected (Bahamish 2004: 11). Instead powerful landlords who had the largest property were able to secure the most water. Large entrepreneurs now own the best land closest to the *wadi* outlet, while small farmers own plots furthest away which receive less water. This is not only problematic from an equality point of view, but also because the farmers who do not receive enough water have to pump from the ever diminishing groundwater (Bahamish 2004: 45). They also found that farmers with bananas needed to water their crop as often as every fourth day, as well as expanding into previously fallow land. Another problem was that with the construction of the five weirs instead of the 10 conflict often arose because two canals had to coordinate together (Bahamish 2004: 13).

8.2 Potentials for IWRM in *Wadi Zabid*

Here, I turn to the three elements of IWRM focused on in this thesis: "recognising water as an economic good", "participation" and "A new water ethic", and I see how these are relevant for understanding and analysing the current situation in *Wadi Zabid*. The section attempts at answering the questions of whether IWRM would work if implemented in *Wadi* Zadib, and whether it would improve the water resource situation.

8.2.1 Water as an Economic Good in *Wadi Zabid*

As we remember "water as an economic good" could be interpreted in various ways each with their own tools. While some of these tools could work in *Wadi Zabid* others might not. The potential for doing so is affected by, on the one hand, the government's ability to intervene in water issues, and on the other, inequalities in the basin.

Government intervention in water issues is relatively low in *Wadi Zabid*. There seems to be no direct payment for water, except some payment for maintenance. Historically, the government has put in place some measures which could arguably be seen as indicators for recognizing water as an economic good. These include the fruit ban of 1985 and diesel subsidies. The fruit ban led to a dramatic increase in the numbers of plantations in the area, and can be seen as a perverse incentive if the aim was to conserve water. However, it did bring great revenue to the farmers. The increase in diesel prices, which in theory could be seen as a type of incentive which would be in accordance with IWRM, seemed to unfairly target those already disadvantaged and did not always achieve the wanted outcome.

The high levels of inequality observed in *Wadi* Zadib is a clear reason for attempting to recognize water as an economic good there. However, the inequality could arguably be exacerbated by various ways of treating water as an economic good and sometimes also lead to undesired outcomes. One respondent told the interviewers that most of the deep wells are owned by wealthy farmers and institutions. Other studies from Yemen have shown that this type of ownership structure may reinforce levels of inequality as water shortage increases. As groundwater table drops, smaller farmers are forced to sell land to large land owners to pay for the deepening of their wells (Lichtenthäler 2003). In *Wadi Zabid* we know that there is a disparity in land, and forms of payment could perhaps increase this gap further. We remember from the background chapter how *qat* producers were the only ones able to absorb diesel

prices when they soared. One could perhaps assume some of the same effect on large scale fruit growers.

8.2.1.1 Incentives

Pricing is an essential part of recognising water as an economic good, according to theory. Both schools discussed in the theory chapter call for the pricing of water, whether as a step on the way to finding the right allocation (the first school) or as a way of covering the delivery of water (second school). There is nothing in the respondent interviews that indicates that water has been directly priced in *Wadi Zadib*. The closest one gets to economic pricing can be seen in the allocation of well water, which the farmers all rely on in addition to the spate water. Well water is pumped by pumps fuelled by diesel, and farmers pay existing diesel prices. As we know the government has previously had as policy to subsidise diesel heavily, but lately, subsidies have stopped and prices are currently fluctuating. Thus, the farmers are currently covering more of the use cost than before. The farmers interviewed in this study unanimously agreed that the high diesel prices had harmed them, and only one claimed that this might help conserve water. His main point however, was on the consequences for the farmers: "It will help conserve water, but the farmers will suffer", he stated. Another farmer explained that someone who does not own his own well, has to pay 50% of the diesel price to the well owner, but only gets 25% of the water. Given that it is through the system of diesel pricing that water price is reflected, the current system increases inequality amongst the *Wadi Zabid* farmers.

While none of the respondents thought that high prices of diesel were likely to reduce groundwater consumption, almost everyone thought that the fruit ban had been positive for the area. There are two ways to think about this. One could assume that high diesel prices actually *do* lower groundwater consumption, but that the farmers do not see it as a solution to their problems because of the large financial burdens. On the other hand, it could also be the case that high diesel prices might not lower groundwater consumption. An indication of the first situation here was perhaps the way many farmers saw the lack of diesel subsidies as negative, but the fruit ban as positive, as the fruit ban would necessarily mean increased use of water.

There were also interesting explanations of what happened when the diesel prices had gone up. One farmer complained that the diesel price was very high, but claimed that everyone pumped the same amount of water anyway. At first glance this is hard to understand, but comments from others help explain how such a situation could be possible. One farmer made the interesting point that as the diesel prices went up, people were looking for other crops which would collect more money faster, and thus they turned to mango and banana. A banana tree can be harvested every 20 days he said, thus giving far more than cereals, which can only be harvested two or three times per year. This is interesting because it is an example of the opposite effect than the one desired by making water more expensive. . What is the "correct" incentive theoretically, pricing water, does not necessarily give the result sought after. This can be an indication of two things. First, the farmers might be in such a difficult economic situation that they cannot adapt or change their mode or production; indeed many of the respondents' answers seem to point in such a direction. This may also explain the fact that several farmers answered that the high diesel prices would not make people conserve more water. Second and perhaps linked to the first, people just do not have water conservation in mind. Few respondents mentioned water conservation in the interviews (one was the engineer), indicating that this is not a question most of *Wadi Zabid*'s inhabitants are concerned with. Obviously, it is more difficult to have people react positively to economic incentives that seem unfair, if they are not involved in the overreaching goal of conserving water. One farmer said that farmers in general were unable to adapt to the increase in diesel price, and that it could not promote water conserving habits because if you water less, your bananas will die. This shows that he does not see the option of growing something different. The reasons for this might be complex, he might not think in such terms, cannot afford to change his crops, or might not want to change. Either way, it is shows how little involved the farmers are with the overall project of water conservation, whether by choice or by necessity.

Some places, there was also indication that the high diesel prices were in fact working as they should, even if they were causing problems for the farmers. For example on farmer said that the prices had caused a halt in agricultural activities, and another farmer agreed saying "it does not help the farmers continue their planting". And one farmer said that agriculture had been expanding, but that when the diesel prices increased agriculture decreased. Particularly this last point is an indication that the high diesel prices to some extent work towards

conserving water, as an increase of agricultural area definitely seems problematic in a place like *Wadi Zabid*.

The discontent of people might be due to their difficult financial situation and that the prices hit the poor unjustly. For example, a farmer explained that he thought the diesel subsidy was positive, but that there were two problems with it. One was that influential people bought it up and sold it on the black market, and second leads many to pump up a lot of water, causing groundwater depletion. One respondent, who was in favour of higher diesel subsidies, said that the diesel prices were against the farmer and that it was particularly bad for the small farmers. While diesel prices in Yemen are still subsidized as mentioned earlier, we remember that they increased in price with 100 per cent in 2012.

Banana is a very water consuming crop. As one farmer said: bananas are good because the more water you give them the more crops you get. The farmers explained that the reason for growing bananas was the high profit they fetched, and so they were also were most of them in favour of the fruit ban. The key informant explained how some crops are naturally water saving – sorghum will produce poorly if overwatered as opposed to bananas – however he said it was difficult for farmers to change their crops because it would affect their income badly. The question here lies in what "difficult" means, whether it means a difficult life situation, or just that it makes little sense to do it when the profit is so much higher from banana planting. So if water was to become expensive, one could imagine that consumption went down just as the economic first school suggests.

The decreased diesel subsidy affected the farmers differently depending on their situation. As one of the respondents explained, a farmer who does not own a well has to pay 50 per cent of the total diesel cost to the owner, however he only receives 25 per cent of the water. Furthermore, higher diesel prices would in his opinion not work as an incentive to protect groundwater because if you overwatered the trees they would be harmed so one would not do that anyway. Be that as it may, the bananas in any case required more water than grains, and an important factor is of course the number of trees in question. This respondent had a farm at weir two, and while we do not know the case for that area in particular, we do know that many of the farmers reported irrigation in areas previously dry or rain fed.

While few of the farmers thought higher diesel prices would help conserve water, many were concerned with technology that would save water and diesel, for example canals or pipes that would convey the water without losing much of it. This could of course mean that while an increase in diesel price is not welcome it would still achieve the wanted result; on the other hand it could be that the farmers are not in a situation to use less water, but that they are interested in saving it any way possible.

Another problem for diesel prices to achieve the wanted result is that it might make those farmers who are able, turn to increased use of flood water. As we know the farmers upstream have been able to control the spate water to a larger degree with the new weirs, another problem with high diesel prices could be that it gives an incentive to water as much as possible with spate water, perhaps at the cost of those downstream. For example, one farmer said that his method of irrigation was flooding and that this was an advantage was the amount of diesel used and quantity of water from the wells – so by using more spate he is using less ground water. This is perhaps another example of how pricing diesel might miss its target: those who have the opportunity to get water otherwise would then do that and leave less for the others who are forced to get the water from the wells.

Many of the solutions to the water problems that were mentioned by the people in *Wadi Zabid* could only be possible with outside intervention in the form of subsidies or enforcement. At the time when the interviews were conducted, such outside assistance was limited. Penalties and legal or financial enforcement, for example, as mentioned by some of the informants, seems to be missing. Many of the farmers lamented the lack of government support.

Some of the demand management tools mentioned in school two are economic incentives such as subsidies and soft loans. This was highly sought after in *Wadi Zabid*. Two other tools mentioned as part of demand management by Savenije and Van der Zaag (2008), are quotas and licences. One could imagine quotas to be difficult to enforce in *Wadi Zabid* as they already have a time based share system which, as already mentioned, many though was not being observed.

The overarching idea of the second school is that recognising water as an economic good means that one takes into account the broader societal and environmental issues, such as

wildlife, recreational uses etc. The farmers of *Wadi Zabid* in any case do not seem able to act upon any such concerns. They do not mention any environmental concerns, and while they know about *Al-Mujaylis*, very few seem to think it their responsibility to do anything about it.

8.2.2 Participation in *Wadi Zabid*

There are many things to suggest that my second, chosen element of IWRM, "participation", could work in *Wadi Zabid*. For example, the farmers there have a long experience with one type of local regulation, the *Al-Gabarti* rule, as well as Water User Associations (WUAs) and other organizations that are in place locally. However, inequality, power, and resources, make any work of a participatory nature difficult to put in place and also limited in what it can achieve. In fact, the farmers seek the support of the government in many cases, but express doubts on what it is able to do.

The president of the Irrigation Council said that many people who were not satisfied with the current system in the *wadi*. Before, people within one of the three groups would share the water, but now some people take everything. It seemed these people had a position that meant they could keep doing what they wanted, or that no-one felt there was any real alternative. One farmer said "Most farmers are satisfied with the current system, but if there exists a better and fairer alternative, we will welcome it". One farmer said "The people who benefit from the current system are satisfied with it, while the ones, who do not, want change"

The respondents who made the claims above are all from *Wadi Zabid*, and thus have little knowledge and no contact with the downstream village of *Al-Mujaylis*. Res2, who is located at weir one, also said that people were happy with the current system, that there was no change in it. And when asked about people downstream of the *wadi*, he mentioned no cooperation and no dispute. While the downstream part is perhaps hard to know because it is really far away, the part about people being happy is perhaps an indication of how those who so far are the winning party are unable or unwilling to realize that there is a problem.

8.2.2.1 Water Users Associations in Wadi Zabid

The WUAs in *Wadi Zabid* not only tell us whether there is any actual decentralization, but also to what extent such institutions are able to get things done. In general the WUAs seemed quite popular. While opinions did vary, the WUAs were mentioned as effective and able to solve conflicts between people. One of the leaders of a WUA said that his association, not

only helped farmers with technology, but also to implements laws One of the leaders of the WUAs said that the associations were able to solve simple disputes. Another said the associations had an organizing role, and also stopped those breaking the rules. One respondent explained that there was an association for each canal. Apparently there was no Water Basin Committee in the *wadi*. One of the key informants, the leader of a WUA, also said that there is a WUA for each canal, and in his there were 500 members. These members voted in the managing board of the association. A farmer from another WUA said that his association had been inactive for a while, but that it was now resuming its activity. While he did not say why it had been inactive it shows that the WUAs are operational to some extent and also survive periods of inactivity.

Some of the WUAs seemed to be able to have some sort of financial independence. One key informant who was the leader of the WUA of one canal said that every farmer in the canal was a member and that they paid according to the size of land they owned. In terms of Kemper et al.'s (2007) framework, the degree of institutional autonomy observed here must be seen as a positive factor. A farmer from another canal also said that the WUAs received money from the farmers to do the maintenance of the canals. It could be that the respondents talking about how the WUAs are not able to do maintenance, as TDA did in the past, are from canals where the farmers are not able to pay enough money – or willing to pay at all, to the WUA. One farmer for example said that "The associations have advantages and disadvantages. Some people seek to protect their own interest and use the WUA for their own gains". Another farmer said that the fairness of the WUAs varied "It depends on the leaders of the associations and the members".

8.2.2.2 Other Local Organizations in Wadi Zabid

In addition to the WUAs operating locally, Tihama Development Authority (TDA), Irrigation Council (IC) and Local Council (LC), are all organisations working locally. However, their contributions seem to be limited, according to the respondents. In *Wadi Zabid* none of the respondents mentioned any personalities that contributed in projects or in solving conflicts. This is interesting in terms of Kemper et al.'s (2007) concept of "champions" as a positive contribution to decentralization initiatives. On the other hand this might not matter much in *Wadi Zabid* where the WUAs seemed to be at least operational. The TDA was mentioned as one of the institutions present in the area. The TDA was mentioned as monitoring quantity

and quality, and also a role in maintenance, and one respondent said that there was collaboration between an institute of agricultural research and the TDA. However the role in maintenance had weakened with the emergence of the WUAs, according to the respondent. He did not elaborate, however, on whether the WUAs had been able to fulfil that same role. Another respondent made that clear and said that "The WUAs are weak because they have no financial backing and cannot do maintenance on canals if they become blocked. This used to be the job of the TDA who were able to do such tasks, but now that the WUAs are stronger there is less maintenance". One farmer said that the local council was "in the pocket" of the powerful people and that it did not help him.

8.2.2.3 Traditions of Inequality?

It was clear that to many the *Al-Gabarti* ruling was either not fulfilling its purpose as intended, or was being violated. Some even said the rule was no longer in place: "In the past, the system for distribution was the *Al-Gabarti* ruling, now it has changed affecting the farmers downstream badly. Because people have banana crops they violate the rule and keep watering their crops several times". It is uncertain if watering crops more than once is a breach in itself, or if this is a way of saying that they keep watering even though their allotted time is over, but it was a fact repeated by many of the farmers. There were also those who maintained that the rule was in place, but that it was problematic in itself. One farmer at the top of the *wadi* said:

> "We here at weir number one do not have any complaints, but those downstream do. In my opinion, the Al-Gabarti rule is implemented, but I think it was made for a time when people grew crops according to season. For example, when we got the flood water it would be the season for red maize and then when they had the water further down it would be the season for another crop".

Another farmer said that "the system of distribution is the old system. I do not know who made it, but it favours those upstream". This does not necessarily mean he and the others who answered in similar terms were against such a system per se. For example, when asked about what he thought about upstream dams one farmer simply said "it is their right" and another explained that it was this way because the rule was *Al 'ala fa al 'ala*. According to some, the problem was not the system, but the context it was in: Although the rights were still according to *Al-Gabarti*, the concrete weirs changed the actual distribution of water. The building of the

weirs was constantly mentioned as a reason for today's problematic distribution. Another farmer said:

> "The problem is a technical one; it is not Al-Gabarti. … We all agree on the time allotments dictated by the Al-Gabarti ruling, but still some farmers water their fields more often. It is because farming has changed and they now use machines instead of oxen, and because they make such good money on bananas that they have expanded their land".

The same farmer also described the many practices he saw as violation of *Al-Gabarti*: watering more than once, watering into lands that used to be rain fed, distributing water in the wrong order, and opening new canals out of existing ones. He also said that now canals had widened from 8m to 50m.

There were also those who seemed to use the *Al-Gabarti* ruling for all it was worth. A farmer located relatively high up in the *wadi*, at the second weir, maintained that there was no change to the system and that the problem for people was the lack of rain and flood water. One of the key informants said that when those at the second weir, who had a lot of water relatively speaking, were approached on the subject of forfeiting some of their rightful share of water so that those at weir four, who received nothing could have some, they had answered that the did not wish the *Al-Gabarti* rule to change.

In terms of Kemper et al.'s (2007) framework, the *Al-Gabarti* ruling raises some questions. In some ways the system in itself constitutes a problem because it allows one farmer to use a lot of water. In combination with modern technology, this becomes unfair as he then can both take absolutely all of the water within his timeshare, and also use it for fruit. As Kemper et al. looked at national or regional systems which might interfere with local decisions, in the case of *Wadi Zabid*, it seems that the local traditional rules, perhaps are the greatest risk of interfering with any new decisions. Also, here, Kemper et al.'s (2007) comment that water rights systems characterised by volume, as opposed to time, are better, seems to hold true.

8.2.2.4 Power and Powerlessness

The WUAs also seemed limited in what they were able to do by, amongst other things, local power relations. While one farmer said his WUA "had no effective role" another explained that they lacked funding: "Their role is limited because they have no financial support. In the past it was the TDA who repaired the canals and they reacted quickly to any needs". Another

farmer said that the WUAs only looked out for their own interest, implying perhaps that some users are not included in the first place represented properly. The reasons for this could of course be many; one could be the relative power of one farmer over the other. Kemper et al. mention the equality in resource distribution in the basin, as something that effects successful decentralisation. Here we know that there is a great disparity between people. With those at the top of the system being able to earn more from using more water.

The WUAs seemed limited in what they could do not just because of lacking funds. One farmer explained that "the associations strive to implement justice in the water distribution, but powerful people are stronger and can ensure that they get more water than others". One of the leaders for one of the WUAs said that his association tried to follow up on projects in the area, but "all we get is promises and only promises" the problem was that things happened randomly and that there was corruption.

There were several mentions of people such as sheikhs or other powerful people who either created or exacerbated resource problems. One farmer explained that "powerful people in the area use force to take more water than they are allowed". Some said *sheikhs* did nothing or that they were only out to protect their own interests. "Sheikhs are influential people in the area and they take advantage of situations for their own good". For example, one of the respondents explained that in an armed conflict, the sheikh had been unwilling to mediate because he himself was a party to the conflict. However the WUAs were also mentioned as having decreased the role of the *sheikhs*. There were also those who though the *sheikhs* had a positive role in for example contributing to solving problems. One farmer said he saw the solution as controlling the people causing problems.

It seems it is not simply a case of democratic WUAs against the self-interest of external powerful people; instead there are power issues within the WUAs as well. As we have seen, people disagreed within the same canal served by the same WUA, on whether the WUAs were effective or just out to serve their own interest. The *sheikhs* were also mentioned as serving their own interest. And there was constantly a mention of influential people who tried to serve their own interests.

The threat or presence of conflict was clearly a force in *Wadi Zabid*. The farmers spoke of an armed conflict that arose between two groups of users at the same weir, where one groups had made a new canal to access the water before their turn. This led to armed conflict between the groups. Unfortunately there were no interviews with the groups who were accused of stealing the water, but although we do not know their rationale for opening the new canal it shows that conflicts may escalate dangerously. This could be an alternative explanation of why the group who refused to share their water were reluctant to change anything about the existing rule is exactly that, the potential for conflict. As one respondent said: "disputes arise when influential people do not follow the system". The fear of conflict did seem to be a factor in keeping things as they were, as pointed out by one farmer: "Yes, this system is better than having problems". Another farmer said that there had been a change in the quantity people received, but that "People are satisfied. Without this system a lot of problems would arise" The respondent furthest down in the valley said that the *Al-Gabarti* system was fair, and that the problem lay with the quarrelling parties upstream. "We cannot change the *Al-Gabarti* ruling; if we do there will be problems".

In terms of whether decentralization is based on local practices, and whether the community is used to governing, which were two of Kemper et al.'s determinant of success. Without knowing to what extent the WUAs are based on local practices, in any case several respondents said that they were happy about the associations but perhaps mainly as a body of maintenance. If it came to reallocation and conflict resolution it is hard to say if they would be able to stand up to the greater powers that they have mentioned. We know there have been problems with violence in the area and one farmer said that although the current system of water distribution was not optimal, he would rather keep it than risk the chance of violence.

8.2.2.5 Problems with the other organizations

Corruption was a problem in the TDA. One farmer said that although the TDA both constructed projects in the area, did maintenance and follow up and monitored wells. However, the problem was that there was corruption in the organization and that it led to problems.

The Local Council did however implement projects in the area according to one farmer as well as solve conflicts between the farmers, while another said that they did nothing and even

overlooked the illegal opening of canals upstream. The only farmer from the bottom group said that the Local Council followed up on projects, and so did another farmer further up in the valley who said that instead it was the WUAs and Irrigation Council were ineffective.

Another issue is Kemper et al.'s assumption that decentralisation initiatives stand a better chance if they base themselves on local practices and institutions, as this increase the chance for acceptance. While their assumption in many ways is correct about *Wadi Zabid* – we have seen that the *Al-Gabarti* ruling is respected by most of the farmers (if not necessarily complied with) – it does not take into account that these practices or institutions might be part of the problem. As we have seen in *Wadi Zabid* where some farmers use the *Al-Gabarti* ruling (more or less successfully) to justify what others see as wrongful distribution of water.

Kemper et al.'s framework says that the economic development in the river basin itself can be important for the success of decentralization. From our respondents in *Wadi Zabid* it is hard to say anything conclusively about the economic situation. Almost everyone commented that the increase in diesel prices were a problem, that agricultural land was decreasing, and also that some large farms in the area were beneficial to the community because they awarded them jobs. All of these might be an indicator of poor economic development.

Whether decentralization is actually happening is also hard to say from the data. To what extent power has been granted is unknown, but at least there is the presence of WUAs as well as irrigation councils. We remember there is no Water Basin Committee. Therefore it might seem that *Wadi Zabid* fills the requirement of having sub basin organisations, but perhaps not basin level institutions. As we know that the village *Al-Mujaylis* downstream is affected by the actions happening upstream in *Wadi Zabid*, and so belong to the same basin, the advantages of communication between these two is obvious. Furthermore, the respondents mentioned the dams upstream of their farms in *Wadi Zabid* which affected their water. As one respondent said "I am against dams upstream, likewise it would be wrong for us to take water from those downstream" however, for the many who did not share this view of equality, they were against the dams upstream and might have benefitted from a forum where they could discuss. One respondent for example said that he wished to complain about the upstream dams, using what was happening in *Al-Mujaylis* as an example. This fits in with what Kemper

et al. (2007: 14) say in their framework about the need for forums where one can communicate and share information.

One of the respondents mentioned education and another information – in relation to the problems between upstream and downstream. Kemper et al. (2007) talk about the need for a forum for sharing knowledge. One way of using less water (given that one does not expand agricultural area) might be drip irrigation. However, this will not work immediately for plants that are used to being watered by inundation. Lichtenthäler (2003) for example, tells the story of farmers in the northern province *Sa'ada* where drip irrigation was attempted without weaning the trees, consequently leading to loss of crop and drip irrigation was therefore abandoned. One of the respondents in *Wadi Zabid* also mentioned that drip irrigation was not suitable for bananas. This is perhaps an indicator of the lack of knowledge available to the people in the *wadi*. Of course it could be that there exist forums for information sharing, but that these operate within the basin without much contact from the outside. One farmer on the plight of those downstream and the potential of cooperation said that the people downstream had his sympathy but "how shall we cooperate, and on what?"

Another indication that there lacked a forum for exchanging knowledge were the different beliefs about suitable irrigation techniques. The key respondent working at the agricultural farm by weir one said that he used drip-irrigation for fruit trees, while another farmer said that drip-irrigation was unsuitable for bananas. A third farmer at the same weir was unhappy with his current method of irrigation, which was inundation, as this demanded so much water and diesel. It could be that these three farmers would have benefited from a forum for sharing knowledge. As the respondents were not asked why they held these opinions there is of course also the possibility that other factors which made drip-irrigation suitable for some and not for others.

Regardless of whether a return to grain production is what was wanted and drip-irrigation was seen as counterproductive, it is a way to minimize the individual farmer's water consumption, and would presumably be welcome by the farmers who could afford this technology. Therefore it serves here first and foremost as an example of the limits of information flow in the *wadi*, assuming that if there existed a forum for sharing knowledge; the farmers might have the same opinion about this.

8.2.2.6 Can the government interfere?

It was clearly expressed in *Wadi Zabid* that there was the need or wish for *more* state or outside presence, not less. There was no direct question posed to the respondents in this particular survey about whether they had a wish to decentralize. As we have seen, the respondents were generally positive to the role of the WUAs in the area, but they also mentioned government solutions as an answer to their problems. When asked about potential solutions to the problem, one farmer said "I suggest that the government should control and monitor". Other's did not mention the government or state specifically but called for "a strong system to control disagreements over distribution".

The government was also frequently mentioned as a way to solve the current situation. All the respondents said they wanted more implementation of water laws. As one respondent explained, they had once tried to stop a farmer from drilling a well illegally. It had helped at first, but in the end he went through with it any way. When it came to the distances between wells (a way of keeping water levels up by limiting number of wells in general and close to each other) all but one said that the distances were not sufficient and a frequent reply was that this (the flouting of the law) was due to corruption.

Several of the respondents mentioned, in connection with the problems with the current system, that they wanted "comprehensive studies". One farmer lamented that there was no support for the farmers. Another complained: "The parliament representative does not contribute, and the branches of the water sector leave most of their tasks unattended". All the people interviewed in *Wadi Zabid* wanted more enforcement or implementation of the Water Law.

Several of the farmers mentioned the raising of weirs 1 and 3 which had affected them, and that this had been done with government permission, but that there had been no proper study beforehand, and that now the farmers at weir 2 and 4 were badly affected by it. One of the farmers had also mentioned that there were large farms in one of the canals at weir one which belonged to "big people" in the government. Possibly commenting on the same project one farmer complained of a spate water distribution project that supposed to make things better but that people were not held accountable, leaving the situation worse off than it was in the beginning.

The idea mentioned that "a fairer and better alternative" would be welcome is perhaps illustrative of the difficulties in the area. While there is great discontent at a situation that is seen as unfair by many, a solution that was more fair, could not easily also be a "better" solution for those who would have to give up some of their water. As one farmer who said he watered his crop every 20 days, said it should be enough for farmers upstream to water their crops only once. Is he perhaps not able to reduce his own crop, even if he thinks it is the right solution.

However, while they demanded government intervention for a lot of things, this does not mean that they are all together pleased with or have faith in what they can achieve, and had seen examples of this. One farmer complained that "one has to bribe for everything!". And many lamented that wells were being drilled much to close because of corruption. It is NWRA who is responsible for overseeing that the appropriate distance between wells is obeyed. Apparently there were at the time "over 50 cases in the court relating to *Wadi Zabid*" concerning wells. Another farmer explained that NWRA did not prevent random drilling "The problem is bribery. They just need a bribe and then they let the people in question do whatever they want. I support monitoring the digging of wells, but it should be licenced and done in a transparent manner". One respondent said that NWRA did monitor and prevent illegal well drilling. Although the people in *Wadi Zabid* seemed positive in many cases to government involvement, there was in no way complete satisfaction with them today. One farmer said that the "governmental institutions do not perform their tasks". Many said that the local councils had no role in the area whatsoever.

8.2.3 A New Water Ethic in *Wadi Zabid* – a question of knowing, caring, and being able

The approach to a new water ethic in *Wadi Zabid* is determined in part by knowledge, and in part by opportunity and wish. People are aware of changes in the water resource and often of the reasons behind the changes which shows that there is an understanding of the hydrological cycle, but on the other hand peoples' actions suggest that they to some extent do not see themselves as part of this cycle as described by a new water ethic. This could mean they are not aware of the effects they have on the resource, or perhaps they are aware, but are in no situation to make any changes, or are simply reluctant to do so.

There are two aspects to the element "a new water ethic" which as we saw in Stage I, was the foundation in the hierarchical structure of IWRM. First, there is the understanding of water as one connected resource, secondly it is that water is vulnerable and must be protected. This protection can in turn according to Armstrong (2006) be traced back to one of four different ethical positions. If Harremoës is right, a water ethic could be a way of regulating water use meaning that *Wadi Zabid* depends on what people are able and willing to do.

8.2.3.1 Seeing the Change

While one can imagine that in many places one hindrance to improving a water situation is simply that people do not know that there is a problem. In *Wadi Zabid* however, it seems that it is very clear to people that changes have happened. These were attributed both to changes in climate as well as the practice of other farmers. People noticed there was less water during the flood than before and also that there used to be a constant base flow, but not anymore. As one respondent said "My father and grandfather told me the flood in the *wadi* used to be three metres high, but now it is only half a metre". Other perceptions were that it had decreased with 50 or even 60 per cent. The respondents also mentioned a sinking level of groundwater.

Furthermore they spoke of a decrease in agricultural activity because there was not enough water. Two of the respondents situated at different ends of the fields noted that their agriculture had suffered. "The water comes once a year, but it does not reach our fields" said one farmer situated at weir five – furthest down in the *wadi*. A farmer at weir three also said he had noticed a change the last two years with some of his lands not getting water. A farmer high up in the irrigation system said there was less spate water because there was less rain. Many observed the connection between the groundwater and the flood water, and explained that when there was a lot of flood water the water level in the wells went up.

Another thing people noticed was how the building of the weirs had affected the water system, and they were often described as negative. Pasture had decreased because there was less grass, and there were now no more springs in the *wadi*.

Water and agriculture were seen by the respondents to affect each other negatively. While there was less agriculture now because there was not enough water, agriculture was also the cause of the water shortage. Banana plantations which had replaced previous crops of grain were explained by many as the reason for the water shortage. And as some respondents

pointed out, even if the groundwater levels went up when there was more flood water, this was not enough to account for the huge amounts of water being abstracted as a result of expanding agriculture and a random drilling of wells to feed the banana crops. While one reason for the decreasing agricultural area was less rain and less spate water, another was the sinking levels of groundwater. A farmer from weir five (furthest down in the *wadi*) said he had to change crops from bananas as there was not enough water.

On the one hand, the frequent suggestion of more rain as a solution does sound as if it belongs to the old way of thinking of water a resource one can tap into indefinitely, and that one lacks a holistic picture and a sense of responsibility in the first place. On the other hand, close to everyone mentioned how water was less now than before and many see the lack of rain as the problem in the first place: "Yes we are aware that water does not reach people further downstream, but that is because there is not enough rain. If there was more spate water it would reach them". However, there were also those who suggested that farmers should only be allowed to irrigate their crops once within their turn, or that the problem was the dams upstream or that wells were set up too close to one another, thus seeing the human activity as part of the water cycle.

However, not all seemed to experience or understand any change. One respondent professed there to be "no change" in agricultural activity, despite all his neighbours saying it had decreased. Another found that there was no effect on the groundwater from the weirs and dams. Not all knew that there were dams upstream of the *wadi*, far away but in the catchment area of *Wadi Zabid*, but it seemed to be common knowledge what was happening downstream. By and large, it would seem people have knowledge about the situation, and while some admitted the people were part of the problem, not all saw themselves as a potential part of a solution counting instead on outside interventions.

8.2.3.2 Being the Change

Many respondents took the view that upstream activities potentially harmed those downstream. For example, some of them said that they know that man-made changes are causing water shortages, yet their suggested solution to the problem is more water. They were both aware of the troubles of those downstream, including *Al-Mujaylis*, as well as the dams upstream. While many responded that "dams harm people downstream" and "the weirs

affected the quantity of spate water and this affects the farmers badly", their suggested solutions for areas downstream of them, was often more rain. As one respondent said, the planting of bananas had affected the people downstream negatively; however his suggested solution was more rain. First of all, this could point to an "old" understanding of water as a constantly minable resource, it is also an indication of either an unwillingness or inability to see one self as a part of the water cycle. Another example of this is the fact that as more water became available to those upstream with the instalment of weirs and concrete canals, they expanded their agricultural area even if there was really no more water available in general. One farmer said that what they needed to solve problems were irrigation projects, as his canal could do with concrete lining. This is of course exactly the type of development which has proved very beneficial for some of the other upstream farmers who were able to use more water, and does not support a consequentialist way of thinking about water for the future and for others.

There are also quite a few people who suggest awareness spreading and knowledge as a solution. For example, the manager of a research farm in the area listed "Educating people on the importance of water, and reducing water use especially in irrigation" as one of his activities. The suggestions were to spread awareness or "educate those upstream of what was happening downstream" and "to let the people upstream know what the situation is for those downstream". One of those who suggested this also said that spreading awareness was one of the roles of women when it came to water. Nobody else mentioned any such role, and most people no role at all when it came to women. This could mean that they are not aware or do not agree that women have any role, but also it could mean that they do not consider spreading awareness as a role or activity worth noting.

While most of those asked knew of the situation downstream, the extent to which they saw themselves as part of a reason varied. Some saw the situation as fixable by God and not their responsibility even if they were helping themselves to a lot of water. Others saw dams as something which harmed those downstream and were only ok if they were fair.

In Islam, water is considered a gift of God (Lichtenthäler 2010) and Allah was mentioned by several of the farmers in *Wadi Zabid*; some maintained that the presence of water was determined by Allah and that if there was more rain it would reach those downstream. We

remember that Armstrong (2006) presented an environmental ethical position based on the idea that people are the custodians of God's creation- This did not seem to be the idea in *Wadi Zabid*. Instead of being the creator to whom they are responsible, it seems Allah is the one who decides whether there is enough water or not. As one farmer saw it "Allah stopped the flood and water for all of us, all of us," and regarding those downstream he said "Allah is generous, he will give them [water]. Neither you, nor I can do it; Allah will grant them spate". Another said that all he could do for those downstream was "Pray to God to send us rains and the problem will be solved". While one must allow for some religious language that does not necessarily reflect a real idea of the role of Allah in providing water, we can say that this does not fit into the category of a theistic position as explained by Armstrong (2006).

It could be that the majority of people in *Wadi Zabid* simply are too pressed for any water ethic to be possible (i.e. they do not feel it) or have an impact (i.e. they cannot act upon it). Although some people are profiting, most people seem to be struggling. Many of the people in *Wadi Zabid* seem to be in a very pressed situation and the attitude of people need not necessarily describe that they are not aware of any problems or do not understand their part in them. One farmer told how before, the income from the farm was enough for him to live off throughout the year, but that it no longer was. Instead he is dependent upon money from his two sons who work elsewhere. He said that the spate did not reach his farm and so he has to pump around the clock from the wells. As he does not own the pump (only the well) he has to divide his income 50-50 with the owner of the pump. Another farmer said he did not own a well, and he could not pay for the high diesel prices for pumping enough water elsewhere from. So while before he could also live off his land throughout the year, he could now only provide food for three months in a year and had to buy food the rest. In general it seems many are in a difficult economic situation on their farms. Several people mention investments in the area that are positive because they offer jobs: "Livestock trading and date factories have given the area an economic boost". And although it does not necessarily denote a low income originally, increased profit was explained to be the reason behind the crop change. One farmer as so many others said the crop had changed compared to twenty years ago. Before they would grow grains but now it was mostly banana and some mango, only 25% of the area grows grain he said. The reason for the change he said was that bananas make more money. As another farmer said "Yes, I changed from maize and corn to mango and bananas. This

change began in the 1990s because bananas brought good revenues for the farmer, so all the farmers headed to plant bananas.

One respondent spoke positively about the increase of agricultural area, and as his farm is among those at the top of the *wadi*, one could perhaps imagine that he was simply not aware of the problem. However, he later told the interviewers, that while he was happy about the investment in the area he said it was problematic because it was not planned and it had made bananas take over for other crops, and because bananas need more water this would lead to the depletion of groundwater and "a catastrophe in the near future". So thinking about the consequences perhaps only for himself (a type of utilitarian ethics) or for future generations (a type of consequential ethics). And while they are not easily identifiable, there does seem to be a group of people in the *wadi* who are profiting at the expense of others in the *wadi*, but are not willing to make changes. We can assume this from the combination of several factors: the high profit of bananas, the reported crop change, over-abstraction and reported differences in water supplies.

If we look at Armstrong's (2006) water ethic which is based on an intrinsic position which we also remember was part of the position of IWRM, it is a very tall order for places where water is already as scarce as in *Wadi Zabid*. Armstrong (2009) himself we remember acknowledged that his first rule of thumb (making water available to everyone and everything) might not always be possible, and in *Wadi Zabid* there is clearly not enough water for what the people consider their needs. In a situation as this, the idea that people should not necessarily be considered before the environment (another of Armstrong's rules of thumb) seems unrealistic for the people in *Wadi Zabid*. Relying on "seasonal mobility or alternative water supply options" (Armstrong 2009: 144) does perhaps require that people subscribe to the intrinsic ethical base. In *Wadi Zabid* people have turned to an alternative supply of water, namely groundwater, but this is in addition to their existing use of the spate water. In a way it is easy to understand that the farmers of *Wadi Zabid* are not very preoccupied with the idea of protecting water. They simply cannot afford to be, or will face a huge drop in income if they do. On a question about redistribution of water for example, one farmer said that while he wished God would grant those downstream water "I disagree to let water pass downstream thereby killing our fields".

One could perhaps argue that technical solutions, new sources of water or seasonal migration are not things the individual or small community can handle on their own. However, Armstrong's rules of thumb are according to him meant to "enable quick decisions in everyday life" (2009: 143).Following Harremoës (2002), it is the actions of the individual, local community that can see a policy through.

When people in *Wadi Zabid* think about saving water it is often in terms of whether any water is lost on the way to their farm, not if water is being used in a way, quantity, or for any purpose that should be altered. So while there are definitely those who see how various activities, perhaps coupled with less rain, have affected other people in the *wadi*, and also suggest solutions from amongst the people, there are also those who either are oblivious to the problems, or only see any potential solution as that of more water to go around. People in *Wadi Zabid* could perhaps be described as having a utilitarian water ethic if anything. They are not really consequentialist as we can see through the rich people upstream in the *wadi* as well as attitudes to *Al-Mujaylis*. If one were aiming for water use regulated by ethics proposed by Harremoës, one would have to target those who hold a seemingly "unethical" view towards water through a "slow educational process" (2002: 118). A question therefore is whether it is primarily people's knowledge or ethic there is something wrong with, or whether they do not have the opportunity to do things differently.

Being against dams upstream of *Wadi Zabid* did not necessarily translate into a reluctance of withholding water from those downstream. This was even if the parallel seemed quite clear. One respondent for example said he would complain against any upstream dams using the experience of *Al-Mujaylis* as proof. So here knowledge does not seem to be the problem, rather will or opportunity. On the other hand a second respondent said that people knew how their water use might be affecting *Al-Mujaylis*, because they themselves could feel the adverse effects of the dams upstream. The constant suggestion of more water as a solution points perhaps instead to a lack of knowledge or at least an understanding of water as something that can be supplied indefinitely, different from the new understanding of water. The other solution mentioned by several took the opposite view, namely that the people who were irrigating their crops more than once had to stop doing so. A question is if those taking what

was seen as excess amounts of water for their crops, had the possibility (or if it was only a question of will) to do so.

In *Wadi Zabid*, most of the respondents did not take a view of water as a vulnerable resource, nor the holistic idea of the water system. While there was a clear impression that there was now less water than in the past, a frequent explanation or suggested solution to the problem was the amount of rain. The people there seem to be struggling, although we know that some are profiting. While for this latter group, one could perhaps as according to Harremoës (2002) turn to the "slow process of educational change of values" this would not help/be enough for the former group. They need help in form of subsidies etc. to change their behaviour.

9 Summing Up and Concluding

Having discussed the different stages IWRM goes through and established how the concept is approached at each stage, I will now conclude by viewing my findings in light of the research question posed at the beginning of this thesis. This thesis asked what the potential of Integrated Water Resources Management (IWRM) was in *Wadi Zabid* and how this potential was affected by the conveyance of IWRM through different stages, and also by the structure of IWRM itself. The answer to that question is divided in three parts, presented in the three following sections. In section 9.1 I will present the difficulties and possibilities in *Wadi Zabid* concerning each of the three elements of IWRM discussed in this thesis—namely "water as an economic good", "participation" and "a new water ethic". In section 9.2 I will reflect on how conveyance—the journey of IWRM from idea to practice—impacts how IWRM works; that is, what was (not) possible in *Wadi Zabid* due to things that affect IWRM as it is conveyed through the other stages. In section 9.3 I will discuss the last part of my research question: the problems related to the hierarchical structure of IWRM. Finally, in section 9.4, I offer a brief conclusion and some comments on future research.

9.1 Opportunities and Challenges in Wadi Zabid

In *Wadi Zabid*, we saw that the problems of water management were many and that some were due to specific local factors, while others were due to structural issues. For example, the weirs which were set up in the *wadi* make control of the water easy for single persons or small groups who take advantage of their upstream positioning. Because of the profitability of fruit production the farmers who are producing on a large scale, or those who are struggling economically already, lack incentives to change their crops. Like many places in Yemen, *Wadi Zabid* is already suffering from a fully developed water resource where all renewable water is in use. A change in water consumption, whether decreasing it in total or redistributing it, will therefore necessarily mean that some farmers will have to use less water. For any change to have an effect on the coastal village area *Al-Mujaylis*, it would have to be a decrease of total water consumption.

There are several potentials for IWRM in *Wadi Zabid*, both in terms of what one can expect to be possible to implement in the first place, and also in terms of what might improve the

situation. Starting with "water as an economic good" it seems that economic incentives such as pricing and subsidies could be helpful. The farmers, who were clearly aware of the deteriorating water situation, were in favour of growing bananas because they were so profitable, even though they knew they consumed a lot of water. If one adhered to the first of the two schools of thought on "water as an economic good", which sees allocation as best carried out through pricing and a market, this would seem as a good solution for the problem. However, as there is no pricing of direct water use for the farmers in *Wadi Zabid* it is primarily through diesel prices that water abstraction can be controlled, and this does not apply to spate water. If anything, higher diesel prices might lead to increased use of spate water to compensate for the rise in price. In terms of a water market it is also hard to say what a market could achieve in an area with such well-established rights, where those with buying power are already those controlling the water. Regarding the water right permits needed in a market, van Koppen (2007) sees these as problematic in places where some people have better contacts and knowledge of the system, and are able to get permits while others cannot. This would probably apply in *Wadi Zabid* where the government was said to be "far away" and "in the pocket" of a few powerful farmers. Followers of the second school of thought on "water as an economic good" evaluate the trade-offs of different uses and make a decision on where it is best to allocate water. Regarding *Wadi Zabid,* there is both the question whether this is within the power of the farmers in *Wadi Zabid*, and even if it were so, whether they share the "water ethic" necessary for this to make a difference. It would seem that neither are the case as those who are unhappy with the situation are not able to change it, and those who are content are not interested in doing so. Instead respondents expressed a wish and a need for the state to put in place positive incentives for less water use, but that people feel the negative incentives hit the wrong way and they are therefore unpopular.

When it comes to "participation", there are many factors in *Wadi Zabid* which one could assume would make participation possible. There is already an organisational infrastructure in place, with Water User Associations (WUAs) for each canal; there is also a long experience with managing water. According to Kemper et al. (2007) recognising local institutions as well as setting up sub-basin committees is a good way to achieve participation. In *Wadi Zabid* however, the various factors in place concerning participation might be at odds with each other. While sub-basin committees would give more rights to those further down, the

traditional system guiding water allocation, the *Al-Gabarti* ruling, favours primarily those at the top of the *wadi*. The Water User Associations (WUAs), set up to govern the different canals in *Wadi Zabid*, are able to perform some tasks of management and conflict resolution and were said to have taken over the *sheikhs'* role in water distribution. The *sheikhs* were seen as unfair, so this represents a positive development; however, the WUAs had apparently taken over the maintenance role of the government run Tihama Development Authority (TDA) which they seemed unable to perform. Kemper et al. (2007) pointed out that an important factor for successful decentralisation was that local institutions were given responsibilities, but that this did not happen too quickly. It would therefore seem that the WUAs are receiving more responsibility than they are ready to handle. The case for decentralisation which is closely linked to participation is also assumed to depend on "the ability of central government officials to strike a balance between supportiveness and intrusiveness" according to Dinar et al. (2007: 38). But the case from *Wadi Zabid* has shown that "intrusiveness" is not the only problem one can have. There can also be a government that usually does little or nothing? This would seem to be the case in *Wadi Zabid* according to the respondents. However, participation through decentralisation might not help the situation in *Wadi Zabid* even if one did succeed in reaching it. If anything, the respondents seemed to wish for more state interference, not less. The fact that violent conflict ensued over water disputes, which government authorities themselves had difficulty solving, leaves little hope that giving this "power" to the local community would improve the situation. There was both scepticism of powerful figures that sought to serve their own interest, and the government seemed to be seen as a legitimate and potentially helpful institution as they took their disagreements there. Kemper et al. (2007) suggest that the success of decentralisation measures depend on whether they base themselves on existing local institutions, and also on the local experience with managing resources. In *Wadi Zabid* the inhabitants have a long experience with managing water, but there was both discontent at how the *Al-Gabarti* ruling was being applied today, as well as unwillingness to change the rule. So while the experience in *Wadi Zabid* might make the farmers there good candidates for decentralization measures according to Kemper et al. (2007), the extent to which they would be willing to change the system is uncertain. This also raises the question of whether the local institutions are perhaps the problem in the first place.

Several of the respondents mentioned that a solution to the problem was watering crops only once, which is dictated by the *Al-Gabarti* ruling. This shows the standing of the ruling. However, we have seen that when modern technology makes it possible to keep water back, and when crops change, the old tradition does not seem ideal anymore. This was also the point made by Moore (2011) made. One of the farmers did indeed say he thought the ruling functioned in a time when one grew different crops. There is also the question of equality between the water users, but while the Dublin Principles talk about achieving "equitable use" (see Dublin Statement on page 45) the *Al-Gabarti* ruling already decides who is entitled to more water than others. On the other hand one might argue that the trouble is not with the traditional system, simply that it is not being obeyed, and that no one in the area has the power to enforce the rule, and that what is needed is enforcement by the government.

Although there are local institutions in place, combining these with new rules or systems imposed or suggested by the state might be difficult. Even if there is experience with governing locally, there is not necessarily experience with collaborating with the state. It could be that as an outside institution, the state ends up disturbing the system in place rather than working with it. Ward (2009) showed an example from another area in Yemen where the attempted change in water management, although based on the traditional rules already in place, failed because people in the end did not agree. Whether this was because of the nature of the water project, or because people disagreed in the first place is uncertain, but it shows that basing changes on existing local institutions is not without problems. In *Wadi Zabid* the earlier project to improve the weirs ended up disturbing the traditional system in place. While many claimed the traditional system was simply not followed anymore, others saw it as unsuitable for the current situation. Any outside changes which were based on the traditional system might therefore disturb the already fragile system in place, rather than be strengthened by it.

Concerning a "new water ethic" the respondents in *Wadi Zabid* by and large seemed not to share the water ethic of IWRM. For some, due to their situation which did not allow for anything else than a wish for more water as they were in a difficult situation already, and some others who perhaps did have the possibility to try conserving water but did not seem interested in this. Furthermore the overall view of the resource was that it was not in their

power to affect the supply although within their area they were aware of the effect they had on each other. The general response from the respondents in *Wadi Zabid* was that they were positive to the import ban on fruit, despite knowing that this affected the resource in a bad way. This could both mean that they do not share the "new water ethic" of IWRM, or that they were simply in a difficult situation economically, in any case however "a new water ethic" did not seem to be present in *Wadi Zabid*. Although Yemen's traditional water management systems are often referred to as a sustainable solution, these I argue do not necessarily belong to a new understanding of water and "a new water ethic". As explained in the chapter on the realities facing the Yemeni government, the traditional ways of managing water in Yemen were not sustainable in themselves but only because the situation of self-controlled water supply made them sustainable. However, as I have argued, it is not just the contextual factors of *Wadi Zabid* that determine the potentials for IWRM there. There is also the question of the other stages and how they play a role.

9.2 Conveyance of IWRM

Economic incentives might seem to have a potential in *Wadi Zabid*, but as has been shown in the chapter on Yemen, the government is extremely limited in its resources, both financially and in terms of power to enforce. Concerning *Wadi Zabid* there is both the question of well water and spate water. While the first is under some kind of regulation, although it seems limited what the government is able to do here, it would seem the only way to impact both water uses would be through incentives. However, as we saw from the example of *qat*, with the huge profitability of growing bananas in *Wadi Zabid* an incentive for a different crop would have to cover this gap. The GWP saw using tax-funded subsidies as a way to target specific groups, but this one might assume is hard for Yemen which is economically very weak. Although, theoretically it might be possible to change some of the money used for diesel subsidies for farmers into subsidies for less water demanding crops this would however have to happen over time, and require a market for the alternative crop. There is also the possibility that one would see an increase in these crops, and no decrease in water use. The GWP is in any case extremely sceptical of subsidies and particularly to irrigation, which is perhaps reflected in the fact the NWSSIP only mentions the possibility for government subsidies once; and that is in relation to infrastructure. The other alternative to reduce water

use would then be to make it more expensive. As mentioned the most feasible way for Yemen to do this would be by increasing diesel prices, which in turn would only directly affect groundwater consumption. Keeping in mind that access to water has been a way for the government both to aid the rural population, but also to gather votes, one has to assume that an increase in diesel prices, which effectively would mean limiting this access, is extremely difficult politically. This offers an example of how the potentials for IWRM is affected by its conveyance. While economic incentives as suggested by IWRM and operationalised by the GWP might be a good solution in *Wadi Zabid*, this element is not able to make it from an idea to reality, due to the problems of the Yemeni state.

One of the important factors for a successful decentralization according to Kemper et al. (2007) was the consistency of government support. In *Wadi Zabid* however, they seemed rather left to themselves when it comes to the state's involvement. The government institutions were seen as not doing anything in the area, and corruption was often pointed out as a problem. For example, stated that the dams upstream of the *wadi* had only been built to gain support in a previous election campaign. While the government provides a place where aggrieved farmers can file their complaints, we have also seen that it is not necessarily able to do anything about the situation. According to the Water Law, the National Water Resources Authority (NWRA) is supposed to ensure equity and avoid depletion, but the case from *Wadi Zabid* showed they were not able to do so. This illustrates how studying IWRM as a concept that is conveyed one can understand not just what might work and what might not work, but also where the problem lies. In this case there is not really a problem with IWRM, or with the context in *Wadi Zabid*, instead the problem lies with the Yemeni state.

The idea of virtual water, which would seem to be a good solution for *Wadi Zabid* would probably face the same problems as the above two examples. If importing water consuming mangoes and bananas for example could be done more cheaply from other countries, it would decrease the incentive to grow them in *Wadi Zabid*. However, we know how difficult the government has found it to go against powerful *qat* farmers by importing *qat*, and it is therefore questionable whether they would be able to go against powerful fruit farmers. Although the fruit import ban in the 80s created an increase in water-consuming fruit crops in its time, the citizens of *Wadi Zabid* explained that today the import of cheap dates from Saudi

Arabia made them unable to grow the relatively less water demanding dates. Furthermore, the lifting of the fruit ban was after all not introduced by water concerns but dictated by the World Trade Organization (WTO). The government has not had the will or power to withstand the WTO nor the *qat* farmers.

While the above three examples deal with the ability to carry out IWRM, there is also the question of the meaning of IWRM being affected by the concept's conveyance; participation for example. While IWRM focuses on participation as a goal in itself emphasising empowerment, the Yemeni Water Law and the NWSSIP see participation as something which can be helpful, but is not necessary and in any case happens within the framework of national decisions. While this seems quite different from the IWRM, it is perhaps not surprising if the GWP is the reference for the Yemeni government when it comes to IWRM, and the GWP also focuses on participation largely as a means to an end. So while evaluating the government's approach to IWRM on its own would imply that they lack a proper understanding of the concept, seeing the whole conveyance of IWRM explains that this is rather a problem with the GWP. While this could be seen as simply changing what IWRM is all about, it could also be seen as a logical answer to a problem connected to the structure of IWRM.

Summing up so far what can be said about the conveyance of "water as an economic good" and "participation": In order to affect water consumption it seems one of the things the government could do was increase diesel prices. This would however not affect spate water, and could mean that more water was taken from the *wadi* to compensate (depending on how much they adhere to the rule). It could also mean the same for other places upstream of *Wadi Zabid* leaving less water to reach our group of farmers in the first place. If the government was able to subsidise less water consuming fruit this might help, but it could also lead to increase in area and not decrease in water use. So it would seem that more than anything one needs people to be somewhat on board with the project which is being implemented. This brings us to "a new water ethic" and the structure of IWRM. The conveyance of "a new water ethic" is closely linked to the structure of IWRM and will be dealt with in the next section where I look at how the structure of IWRM itself affects the potential.

9.3 Structure of IWRM

In the first part of this thesis I mapped out what the different elements of IWRM were and showed how they could be grouped into beliefs, goals, and tools. The tools are there to help reach the goals, which in turn spring from the beliefs. The beliefs are all part of the overarching water ethic ("a new water ethic") that is the foundation for IWRM. Thus one can say that the elements of IWRM are structured hierarchically, with "a new water ethic" at the top followed by the beliefs, which are followed by the goals which are followed by the tools.

IWRM assumes through its hierarchical structure of elements that those doing the deciding agree with the new water ethic. Therefore, maybe it is that they view participation as a way of empowerment and that it is "only right" that people themselves make the decision about how to protect and optimize water resources – because that is a given that everyone wants to do that. As Bruns (2007) has explained above, that might not be the case. Article no 48 of the Water Law for example, illustrates a problem with the structure. The government is to encourage participation in management and conservation of water resources. However wanting people to manage water is one thing; wanting them to manage it in a way that conserves it is another. Here we see the structure of IWRM coming into play. As long as people are on board with the belief, you can delegate tasks to them, but if they are not you will not necessarily get the conservation you were hoping for.

According to Harremoës (2002: 113) "the success of policies depends on daily decisions and activities of the individual, local communities and companies as much as on centralised rules and regulations". IWRM, according to the Dublin Principles, seems to take for granted that these decisions and activities fall within the perspective of a new water ethic. This is not uncommon, as Armstrong (2006) pointed out, many statements about water protection or sustainability take for granted that we have to protect water, but do not question or explain why. Gleick for example who explained how the understanding of water had changed, talks about "backcasting" the future we want (1998: 572), which means determining what to do to reach the new vision we have for water resources. The question then becomes whether everybody agrees with this vision. The GWP to some extent seems to compensate for the potential lack of such an ethic among users this by relying on national laws and policies, and not giving too much power away in participation. However, sceptical of relying on rules to enforce an ethic, Harremoës explains that "command and control" approaches were

problematic because people grow tired of all the rules and therefore forget what is the ethical value of all this. The GWP on the other hand focuses more on setting rules; their primary focus being on legal change and a market operating within set regulations. Whether this is problematic or not, depends upon whether you assume (like Harremoës) that there is an ethical value already present that you are corroding, or whether you are trying to compensate for an ethical value you consider to be lacking. The GWP seems to fall into the latter category, which we see from how they approach "participation".

The GWP's view on how stakeholders should participate is in my opinion quite a way away from the original Dublin Principles. Chambers (1995) claimed that "participation" is being used differently by different people and one can think of it either as a "means" or an "end". The GWP seems to have a much more "means" focused view on participation. Participation is to a large degree a way of getting something done, and not a goal in itself. But this in many ways makes perfect sense if one is in the predicament of handing over control to people of something which they do not necessarily agree with. The lesson from *Wadi Zabid* in many ways justifies this approach. If the goal is to conserve the water resource (one of IWRM's goals), it seems questionable how well this would be achieved by a community which does not necessarily agree with this goal or share the ethic behind it.

Here we see the hierarchical structure of IWRM and see that while the concept is actually quite normative, it does not address the fact that "a new water ethic", which is the foundation for the whole concept and all its elements, is not necessarily something that everyone agrees with. This can only be said to be dealt with in the Dublin Principles by one of the elements, "raising awareness", which in any case only deals with it very briefly: "The participatory approach involves raising awareness of the importance of water among policy-makers and the general public" (See Dublin Statement page 45). The GWP on the other hand addresses this by focusing on the "creation of shared visions" (GWP ToolBox 2012), a phrase which can also be found in the Yemeni National Water Strategy and Investment Plan (NWSSIP) which states as an objective "the creation of a shared vision among stakeholders to guide water resources management efforts" (RoY 2004: 24). This then, also offers an example of conveyance can affect the potentials of IWRM more positively, as weaknesses can be addressed by another stage.

However, everything will not follow automatically from spreading awareness of for example water scarcity or links between water uses. The challenge for Yemen seems in many ways to be the difficult position they are already in. After all, it would seem that the agricultural policy in Yemen was a school two treatment of water. They were deciding that water for food self-sufficiency was a "good" cause to allocate to. In Yemen's case, I have explained how the plant *qat* consumes an enormous amount of Yemen's water, but also in many ways became, and still is, the natural choice for farmers—Mundy (1985) called it a "wonder cure" for the agricultural economy—as it can be a way out of extreme poverty.

In the context of *Wadi Zabid*, when we think about participation in terms of empowerment, the results could both be poor or a success depending on what interpretation of participation one has. From a pragmatic perspective, as there is so much conflict it is perhaps limited what participation would be able to achieve, and uncertain whether less powerful farmers in *Wadi Zabid* would be able to control the more powerful ones. However from a normative perspective, this might still be considered a success. If for example participation was seen as part of a long-term empowerment project. This is not to suggest that power relations do not matter in the last case, but the goal is not some immediate achievement through participation, as it is from a pragmatic perspective. IWRM, as explained by the Dublin Principles, leans more towards a normative approach, as I have previously argued. However, this then creates a situation, where according to IWRM, participation should be advocated even if it does not yield results within water management. This can clearly not be the case as the principles after all are about the management of water. Instead it underlines the fact that the element "participation" seems to need the presence of a specific water ethic to work.

While there were many aspects of "water as an economic good" that were problematic due to the lacking capacity of the Yemeni state, there were also factors in *Wadi Zabid* that seemed problematic, and these could have something to do with the structure of IWRM. For example, one of the solutions mentioned as part of treating water as an economic good, was technological improvements. However, we also remember that Hellegers et al. (2011) saw little potential for technological improvement in Yemen because it functioned as an incentive to increase production (using the same amount of water) rather than decrease water consumption. This seemed to be the case in *Wadi Zabid*. The farmers explained that after the

improvements of the canals water was being used to water areas which had previously left fallow. In other words simply providing an alternative will not necessarily have the desired demand (in this case decreasing the use of water). Under the assumption that one is working within a "new water ethic" it makes perfect sense to provide an alternative and wait for the change to happen, however, from another point of view than the new water ethic, there is no reason why more crop per drop, should not mean more crop in total. Again this can either come down to the fact that this water ethic is not shared, or that it is simply an unaffordable luxury for people in a difficult financial situation. The same could be said about economic incentives such as a higher diesel price. On the one hand, it could be assumed to have some effect independently of the rest of IWRM, after all most people reported that the overall planted area had gone down as the prices of diesel went up. On the other hand, people were pushed in the "wrong direction" describing that they were forced to use more water because of the high prices.

Concerning the second school of thought's approach to "water as an economic good", the hierarchical structure of IWRM also comes into play. This school's focus on choosing the "best use" for all of society could in theory mean anything. It is only when combined with a "new water ethic" that it becomes what Savenije and Van der Zaag (2002) envision it as (i.e. promoting efficiency equity and environmental integrity). The same goes for participation. A participatory approach alone could achieve a myriad of things – it is because it is combined with a new water ethic that it is thought of as a part of a "good" water management thing. When these things are presented as individual tools to be interpreted and used as one wills, they could achieve completely different things than they are intended to, all depending on local situations at the stages in question.

For the respondents in *Wadi Zabid* it seemed they did not feel water was under their control. It either rains a lot or it rains a little, ground water goes up and groundwater goes down and there's nothing very much you can do with it. Of course in *Wadi Zabid* they are well aware of the effects of too close wells, and of taking a lot of water upstream, but they are maybe not part of an overall change away from controlling water to taking care of it. However, perhaps the biggest problem with the hierarchical structure of IWRM is that the new understanding of water which the concept grew out of that and which is embedded in the concept as the

element I have called “a new water ethic”, is that this understanding seems to primarily assume that it is only a question of realising that human activities are for example polluting or depleting water resources and that this is problematic, and as soon as this is realised, suitable action will follow. This is obviously not the case for people in a difficult economic situation who might not have an alternative to their current resource use. In *Wadi Zabid* we saw that while some farmers seemed able but reluctant to change their water use, most farmers first and foremost explained that they were hardly able to cope with the water they were using as it was.

9.4 Conclusion

In this thesis, I have looked at the potential for IWRM in *Wadi Zabid.* Overall, the conclusion is that although there are strains of possibility for IWRM to be successfully implemented there, the concept’s conveyance through different stages—especially the government of Yemen—makes it difficult, and that the very structure of IWRM is the main hindrance towards its successful implementation.

This study contributes to the existing field of research in a number of ways. It provides a picture of the current situation in *Wadi Zabid*. It gives an insight into the daily life situation concerning water management there, and of the various hindrances and possibilities. I have also analysed and filtered out the different ways in which IWRM has been and can be understood, and developed a methodological framework for the study of IWRM implementation locally. This is a framework which can be used and altered to study other cases of IWRM implementation around the world.

The part on IWRM is however not only an important methodological contribution. The understanding created through the analysis of IWRM gives a greater insight into the functions of IWRM. This thesis has shown that IWRM is not only a controversial way of managing water and a vague concept. Rather, it consists of a number of intertwined elements that build on each other, and which build on an overreaching normative value of how water should be viewed and dealt with. This normative view of water has profound influence on how IWRM works locally. It is this overarching, but somewhat hidden water ethic, and the way IWRM is structured which in turn limits its potential in *Wadi Zabid*.

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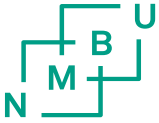

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