Richard Meissner

Paradigms and Theories Influencing Policies in the South African and International Water Sectors

PULSE^3, A Framework for Policy Analysis

Springer

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Chapter 1
Water Research in South Africa

1.1 Introduction

In this introductory chapter, I will talk about the nature of water research in the South African context. In short, research scientists study water resource management in its various facets to ameliorate problems that could negatively affect human populations and the natural environment. This is the popular view of water research, its nature and motivation for embarking on the endeavour. There is, however, more than meets the eye. A subliminal reality exists when we conduct water research: the myths we adhere to as water researchers. In this chapter, I will explore the myth aspect and other elements characterising water research in more detail. I organise the chapter as follows. In the first section, I will investigate and report on myths in International Relations theory and link the arguments contained in this rendition with that of water resource governance and management. I will then tell the reader what the book is about; in other words, the essence of the book and why I think it is necessary to write a book reporting on my investigation in research paradigms and theories in water governance and management. I will then demonstrate the issues I will address in the rest of the book with three short case studies: acid mine drainage, integrated water resource management and transboundary river cooperation. In the penultimate section of the chapter, I will elaborate on how I think we should think about water research. I then elaborate on critical solidarity as a way to enact such thinking. I will then end with a conclusion.

1.2 The Myths We Rely on

The natural environment is the well-spring of the water resources we need for various activities. This is in a sense a 'myth', or an apparent truth expressed in slogan form on which a theory relies upon in order to be true (Weber 2014). Let me

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explain this further. Weber (2014) argues that International Relations theory contain myths. A ready-made argument to discount what I am about to say would be to argue for the difference between International Relations theory and water governance and management. My contention is that if we would like to deepen our understanding of water resource issues, we need not look at the connection between subject matters, but rather compel ourselves to see the nature and substance of critical argumentation. I believe that Weber's (2014), and other International Relations scholars for that matter (e.g. Wilson 1998; Osiander 2001; Teschke 2003; Hobson 2012; McDonald 2014), argument is sufficient to warrant a linkage with water research issues. The reasons for this will become apparent during my rendition of the connection between International Relations theory and myths. In particular, McDonald (2014 referencing Smith 2005) states that everything, even science and empiricism, has been questioned and that the myths these contain are challenged and undermined. That said, science and empiricism, the foundations of water resource management in South Africa, contain myths.

Nevertheless, Weber (2014) reminds us that International Relations theory develop and contain organised generalisations about global politics in that we find a 'collection of stories about the world of international politics' in International Relations theory. When International Relations narrate world politics, it says something about the occurrences and events happening in the world. In addition to these stories, International Relations also 'imposes its own vision of what the world out there looks like' (Weber 2014: 2). This raises an interesting question—what appears to be true in world politics (Weber 2014) or, water management, for that matter? It is here where myths come to play an important role. Myths are part of the water management story so familiar to us that we take it totally for granted (e.g. Weber 2014) when we hear these stories. Said differently, we start talking about water resources and water's source in such a way that we do not question the statement but take it as a given. This is the case with the slogans 'the natural environment is the well-spring of the water resources we need for various activities' and 'water is life' (a bit on this last slogan later on).

What is really at stake in the arguments around International Relations myths (that water resource governors and managers can learn from) is not the inherent 'untruths' contained in slogans. After all, myths are not necessarily untrue (McDonald 2014). Yet, the perceived 'truths' or myths instill in us and how we don't question these apparent 'truths' are what is really at stake. For example, one such myth is the 'positivist myth' of International Relations theory, and by extension, water resource governance and management that the theories have a fundamental value-free epistemological base. Even so, critical theorists like Cox and Sinclair (1996) argue that theory is always for someone (Hobson 2012 in McDonald 2014) meaning that people, scientists included, develop theories to exert power and influence over others. What I am trying to say with this is that myths are, in themselves, not malignant! How research scientists develop them, communicate them and take them on as absolute truths is the crux of the matter. How we produce

myths and how we take them for granted in water research is similar to what is happening in International Relations theory.

It is true that water originates in the natural environment humans inhabit. But by stating that it is the only source of water is to divorce it from the ways and means humans interact with it, whether through dam construction, desalination or waste water recovery and other technical means. This water as a natural resource allegory is quite strong in the South African water research community and it manifests in a number of ways.

The most visible expression of the metaphor is that the water problems created by, and affecting humans, can only be solved in a technical or positivist scientific manner. Positivism becomes noticeable not only when there are calls for the advancement of water purification technologies but also in the constitution of non-technological endeavours like governance and management systems at the organisational level. In my opinion, positivism has a strong presence because we are dealing with a resource that originates from the natural environment. Said differently, because we are dealing with a natural substance (water) that can be controlled and manipulated (to a certain extent), it follows that the natural sciences should play *the* role in investigating water resource governance, management and politics. The perceived reality of water's origin dictates how we study it, use the resource to our advantage and what governing, management and administrative systems we need to develop and implement. For instance, over the years, I have attended a number of water research conferences and workshops to hear researchers promoting the methodology of water footprinting—measuring water in the full supply chain of the production process—for the business community (e.g. Hoekstra 2003; Hummel et al. 2006; IGEL 2011). At other workshops, research scientists propagate the strong points of integrated water resources management in paper after paper followed with recommendations on how South Africa, or at least government, should strengthen the implementation of this type of water management system's elements (e.g. Jonker 2007). There is nothing wrong with these management systems. The only drawback is that they are based on a certain research paradigm that we are taking for granted—positivism and their propagators give us the system's benefits in slogan form.

I picked the following slogans about water footprinting and integrated water resource management to illustrate my argument. On water footprinting: 'Companies face substantial business risks related to water, and investors require them to be forthcoming. For companies concerned about these risks, *water footprinting… is a logical next step*' (emphasis added) (IGEL 2011). 'Water footprinting looks at each element of SABMiller's value chain, from crop production to product distribution, to help understand the water dependencies and vulnerabilities and *identify the key water risks for the business, surrounding communities and the environment*' (emphasis added) (SABMiller 2010: 3). Lastly, 'water footprinting is suited to (*and indeed is one of the few available options for*) mapping likely hotspots for water impacts and risks across a supply chain; at the same time, it is an extremely complex approach which is still evolving, including in successive applications by corporations' (emphasis added) (Mason 2013).

Slogans pertaining to integrated water resource management include the following: 'Implementing IWRM at the river basin level *is an essential element to managing water resources more sustainably*, leading to long-term social, economic and environmental benefits' (emphasis added) (Matsuura, No date: Foreword). The GWP defines integrated water resource management as: 'a process which promotes the coordinated development and management of water, land and related resources, *in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems*' (emphasis added) (GWP 2000 cited in Mehta et al. 2014: 2). Lastly, '*good IWRM processes can…help developing countries to achieve the Millennium Development Goals (MDGs)*' (emphasis added) (Funke et al. 2007).

I argue that water footprinting and integrated water resources management are theoretical approaches that give a broad overview of water resource management's state and how researchers can influence that condition through specific recommendations. There is nothing wrong with this type of knowledge or how it is generated (e.g. by following the positivist research paradigm). The researchers and institutions mentioned above have contributed a great deal of quality research that influenced the South African and international water policy debate in a (predominantly positivist) direction. What is omitted from the analysis of water resource governance and management is the meta-theoretical building blocks of how we gain knowledge, how we view reality, our data and information gathering methods. Said differently, there is a dearth of the foundational meanings of ontology (what is the world made of), epistemology (how do we get to have knowledge of the world) and methodology (what methods we use to gather data and evidence) (Rosenberg 2012). For me, it goes further than ontology, epistemology, and methodology, although these are aspects deeply embedded in the philosophy of the natural and social sciences.

To take this argument further '…it is impossible for research to proceed in any subject domain in the social sciences in the absence of a set of commitments embedded within positions on the philosophy of science' (Kurki and Wight 2013: 14). What is it that is so important regarding the philosophy of science Kurki and Wight (2013) talk about? I believe that there exist a scarcity of explicit meta-theory and theory because many of the water research community's participants believe that theory is unnecessary clutter belonging in the classroom and not on the policy making stage. I furthermore believe that there are those that do not know about meta-theoretical developments or even about the presence of meta-theory (constituting research paradigms) in water resource investigations. There are those researchers that know about so-called 'practices' that are in fact theories and promote them on the basis of their dogmatic insistence. In this respect, strategic adaptive management is put forward as a management approach that caters for complexity and values and multiple models (Pers. comm. D. Roux, 27 June 2015).

1.3 Science as Constant Critique

Having introduced the text in such a critical fashion, I would like to note that this is not another book on integrated water resource management, transboundary river cooperation, and strategic adaptive management or benefit sharing. This book would have been written even if these practices and theories had not been the 'hype.' This study is about science, or more specifically the philosophy of the social sciences, in water research. The study is primarily about research paradigms and theories. When thinking and writing about research paradigms and theories, I agree with Kurki and Wight (2013) that science is not the dogmatic insistence on the certainty of its claims. Science is a commitment to constant critique (Kurki and Wight 2013) or to be more specific, 'science is about critiquing openly published data and methodologies…' (Goldacre 2009: 320). I believe that we do not have a well-founded way in water research to critique or problematise scientific research. Because such a method is absence, the service research scientists render to the policy community, is limited. Water research suffers from a straightjacket confinement because of a lack of open and constant critique since it is too easy to believe the myths in the water research domain.

Whether or not science is about critiquing in general or critiquing data and methodologies, science is about critique, the questioning or the problematisation of other scientists' investigations. Here I would like to be clear, I do not mean to critique the individual scientist or researcher, but rather the science that the scientist or researcher practices. To elaborate further, science is replete with conventions and the practices based on concords and deductive authority statements. Without pluralist debate, science is, in my view, not possible. I acknowledge that the research goals and methods in the natural and social sciences are fundamentally different (Lebow 2007). In this vein, Abbott (2004: 19) notes that the debates between different scientific methods (e.g. quantitative versus qualitative methodologies) are a rich source of new ideas and should therefore not be frowned upon. I am in agreement with Winch (1990) and Kurki (2006) when they say that the social sciences are about the studying of the reasons of social actions and not so much the causes thereof. This is not to say that causes are unimportant. I am merely saying that the exclusive focus should not be on causes in the social sciences like we think about causes in the natural sciences. This is so because the internal relations between meanings, rules, reasons, and actions cannot be treated in a similar manner to the external relations of events; the social sciences are not suitable for generalisation and prediction in the same way as the relations that some of the natural sciences study (Taylor 1985 in Kurki 2006). We are dealing here with two different scientific disciplinary approaches, and for this reason, we need a pluralist debate to advance both the natural and social sciences within the South African water research sector.

In the social sciences, theories can provide probabilistic instead of deterministic truths, which is the case in some of the natural sciences (Chernoff 2007). Having said that, prediction is only one form of knowledge (Lebow 2007) and not the

ultimate in (social) scientific endeavour. To take this argument of the difference between natural and social scientific knowledge further, Kurki (2006: 194) argues that: 'Assessing human behaviour from the point of view of general patterns of behaviour misses out the crucial role that rules and reasons play in "constituting" the meaningful context of social action.' Said differently, should we approach the social sciences methodologically, ontologically and epistemologically like the natural sciences, we will miss or ignore crucial elements (e.g. rules and reasons) that form the actions of social actors. This book is mainly concerned with what research scientists are missing in South African water research.

This book will move away from the actions of generalising and predicting the social actions and behaviour of actors in the South African water sector. For me, it is quite impossible to generalise and predict the behaviour of one actor or set of actors in the water sector because of the large variance of actor behaviour across a large number of social and natural environments (e.g. Meissner and Jacobs 2016). There are just too many variables that we need to take into account to make successful generalisations and predictions. Because of a large number of variables at play, it is in my opinion impossible to control, in a scientific way, cause and effect relationships. For humans to identify causal mechanisms in social contexts it will be necessary to identify the appropriate empirical variables (King et al. 1994 in Kurki 2006) and natural and social scientists are just too subjective to make the correct identifications all the time, every time. This can be problematic in the study of the role of research paradigms and theories because every research paradigm and theory put forward a different set of (metatheoretically) 'appropriate empirical variables' (King et al. 1994 in Kurki 2006) that explains reality, how reality should be studied, or what explains certain aspects of a reality.

By endeavouring to identify the 'appropriate empirical variable' could very well miss the 'multiplicity of different types of evidence to be appreciated' (Kurki 2006: 196). This means that the 'obsession' to isolate specific empirical variables can be a hurdle rather than a reliable approach to conducting research and/or science. For instance, discourse analyses that do not conform to positivist ontological and epistemological criteria will be ignored and historical and qualitative data would be treated as if they happen repeatedly and with the same frequency over time (regularity) (Kurki 2006). But humans are unable to identify all the variables all the time; our sensory capabilities are just too limited. Even so, by ignoring certain data sets or forcing those into a 'regularity straightjacket' (Kurki 2006), gives rise to generalisations and predictions and recommendations to practitioners that are based on a constant reoccurrence perceived over time. That said, by repeating the identification of specific classes of variables through one research paradigm is more an inhibitor than an assistant in our scientific endeavours. Generalisations, predictions, and recommendations generated through a 'regularity straightjacket' are, in my view, misleading and not giving the full picture of every unique case when doing social inquiry. The result is, I believe, decisions based on a limited number of prioritised variables leading to decision-making processes that do not consider seemingly less relevant factors.

Looking at the above-mentioned argument, a counter argument could be put forward stating that research scientists will confuse policy makers if they sketch contexts and issues from a polycentric perspective. For me the basis of such a counter argument is a position of power. Those adhering to the belief that we need to give policy makers regularities otherwise we might confuse them, create for themselves a legitimising context in which they can continue to have direct access to policy makers while excluding critical others (more on this later on when I deal with narcissism in critical solidarity).

While we are on the subject of ontology and epistemology, this study looks at meta-theoretical (philosophical) and scientific aspects, but not in the traditional sense of interpreting what they mean or how to achieve their different objectives. To put this argument into perspective, acid mine drainage, integrated water resources management and transboundary river cooperation, for instance, rely to a lesser or greater extent on research paradigms and theories to ameliorate their associated problems.

1.3.1 Acid Mine Drainage

It would be hard to argue that the condition of South Africa's water resources is not in a sorry state. This is where consensus ends. There is a raging debate on how to better the situation of the country's water resources. This is not to say that the debate is running along the fault lines of theories and paradigms, but rather what should practically be done about the water sectors' problems. For instance, to remedy the issue of acid mine drainage on Gauteng's Witwatersrand calls for more government intervention and the initiating of engineering solutions to purify water before releasing it into the environment. To do this scientists and policy makers are considering and implementing a number of methods and governing approaches.

The Department of Water and Sanitation (DWS) uses the neutralisation method that removes the heavy metals for the water but not the sulphates. Then there is the eutectic freeze crystallisation method. Professor Alison Lewis is researching the method at the University of Cape Town. The water's temperature is lowered to the lowest possible temperature of solidification for a mixture of components (i.e. the eutectic method). Through this process ice and salt form. Ice floats to the top of the water body's surface while salt sinks; the one being lighter than the other, respectively. It is then possible to recover water and salts separately. According to Shafick Adams from South Africa's Water Research Commission, the challenge is not finding treatment methods, but funding institutional arrangements. Jo Burgess, also from the Water Research Commission is of the opinion that there is a challenge in finding who should be responsible for paying for the treatment (Kolver 2012). Her opinion also resonates with the funding argument made by Adams.

In this regard, the problem of acid mine drainage and its resolution rests on both technical and engineered solutions, the cost of treatment and ethical considerations (who should be paying). There is therefore a societal dimension to the problem as

well, and this dimension cannot be divorced from human decision making processes and procedures. The example of acid mine drainage and what experts are saying about the solutions and the *real* challenge (who should pay for the treatment) brings into focus how humans perceive the world and what should be done about problems affecting the natural environment and ultimately the human condition. What is observable about the discussion of the technical remedies, and the challenge of who is responsible for carrying the cost, is the way in which people view these seemingly separate issues.

Experts are proposing a technical solution to both matters. In early 2014, Odendaal (2014) reported that the Constitutional Court ruled that the responsibility of acid mine drainage is the onus of the land owners (i.e. mining companies) even when the land no longer belongs to them. So, the problem of who takes responsibility for payment was solved through legal means. But how will this affect the overarching issue of acid mine drainage and its environmental consequences? Are the technical solutions and the Constitutional Court ruling the panacea for acid mine drainage? What other actors and factors could help find solutions or thwart amelioration of the problem?

The answer to these questions are that technical solutions and assigning responsibility are good in tackling the problem but we should not forget how human behaviour can influence the matter in future. The technical solutions and court rulings might seem like panaceas, but human society and the natural environment, for that matter, are influencing factors that could either have a positive impact or bedevil the process. The interaction among societal actors '…is a causal process of mutual adjustment that often has *unintended consequences*' (emphasis added) (Wendt 1999: 82). Because of the nature and outflow of social interaction, I am reluctant to support hard and fast answers to the questions I pose above. Yet, the point I would like to make is that technical solutions (be they engineering or legal) are important in constituting solutions but not enough to solve the problem altogether. Human behaviour will ultimately determine how and to what extent we solve the problem and this will obviously take time.

1.3.2 Integrated Water Resources Management

Integrated water resources management's operation ranges from empiricism to postmodernism when scientists describe its thought processes (Claassen 2013). Within the ambit of its application in the political economy, the practice can be found in neorealism and classic structuralism. From an International Relations theory perspective, integrated water resources management is at home in neorealism[1] and

[1]Stated very basically, neorealism is a systemic theory of International Relations that rests on the basic assumptions that states are the most important role players in world politics and that there is a clear distinction between the domestic and international political domains (Powell 1994).

social constructivism[2] (Claassen 2013). Nevertheless, and according to Swatuk (2005), the ideologies and interests of Western states and civil society, drive integrated water resources management. Should this be the case, the practice has an underlying ideological, research paradigmatic and theoretical disposition favouring rational choice.[3]

Be that as it may, the concept 'integrated water resources management' has been around for about 70 years. In the 1990s the concept was rediscovered (Biswas 2004) and it relates to the coordinated development and management of water, land, and other resources relating to water and land. The argument behind the approach's purpose is to maximise economic and social welfare in an equitable way so as not to compromise the resources for future generations (i.e. sustainable development) (GWP 2000; Swatuk 2005; Funke et al. 2007). From this definition, it would appear as if integrated water resources management has multi-theoretical origins, but its application fits the positivist research paradigm. There is an ongoing bias towards certain kinds of rational knowledge in policy making as well as the overall state-centric context through which water is managed across the world (Pers. Comm., S. Nienaber, 9 June 2014). Saravanan et al. (2008: 4) confirm the use of rational knowledge and state centrism when they note that: 'The controversies [around the implementation of integrated water resources management] involved contestation of the *rational techno-centric approach* by various social movements, mainly in developing countries' (emphasis added).

A closer examination of the history of integrated water resources management reveals some interesting paradigmatic features over the course of its history. In the latter half of the 20th century, integrated water resources management shifted from a single purpose project and river channel engineering perspective to a multi-purpose project and catchment management style. The state was the central actor in facilitating this move (Saravanan et al. 2008). Then social movements such as interest groups (e.g. the OvaHimba questioning the implementation of the Epupa Dam across the Kunene River in the 1990s) started questioning the implementation of integrated water resources management and the way it is implemented without taking land resources into consideration (Saravanan et al. 2008; Meissner 2004, 2005).

The linearity of addressing poverty was a cause of disagreement for interest groups (Saravanan et al. 2008). The result was a change in water and

[2]Simply put, social constructivism is another International Relations theory that emphasises the importance of the norms and the identities of international actors in world affairs (Ruggie 1998).

[3]Rational choice is another influential theory in the discipline of International Relations and builds on the fundamental aspects of the modern economy. The theory notes that the actor is central to political processes and more specifically actors that are utility maximisers. As such, decisions by actors, individual or collective, are based on cost-benefit analyses (Coicaud 2014). According to Isacoff (2015: 26) '…[rational choice theory's] aura has been quite prominent in the soft positivismof structural realism. Most of realism's core propositions—in particular, that actors are unitary and rational—are derived from positivism, generally speaking.'

land management approaches in that developed and developing countries, South Africa included, started implementing 'a consensual and communicative approach in depoliticising resource management by integrating different interest groups through a participatory approach, in addition to integration of land and water management' (Saravanan et al. 2008: 4).

Governments and international organisations, like the Global Water Partnership, (established to implement integrated water resources management and to involve all stakeholders in the process) started operationalising integrated water resources management. The Global Water Partnership developed a 'toolbox' to implement the process outlined in Fig. 2.3 (GWP 2014). States and international organisations started formulating integrated water resources management policies, programmes and plans (Saravanan et al. 2008). A good example is South Africa that incorporated integrated water resources management in its 1997 National Water Policy (RSA 1997) and the National Water Act (No. 36 of 1998) (RSA 1998). At catchment level, catchment management agencies will implement the principles of integrated water resources management (Saravanan et al. 2008; Meissner and Funke 2014) (Fig. 1.1).

Figure 1.1 shows the linearity of this particular water resource management process, which is similar to the policy process. The question that now arises is to what extent has this planning cycle being carbon copied from the traditional policy cycle. More profoundly, where is the innovation in this water resource management planning cycle and to what extent does it incorporate new ideas? In my opinion this is a mere repeat of a planning cycle that had been in existence for decades.

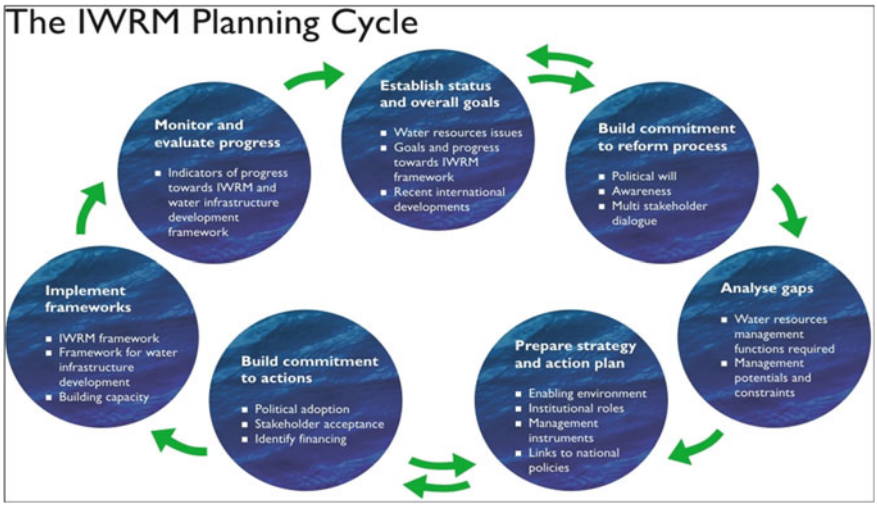

Fig. 1.1 The integrated water resources management planning cycle as outlined and concretised by the Global Water Partnership. *Source* GWP (2014)

An astute observer commented on researchers' views of integrated water resources management in the following way. During a conversation on how integrated water resources management is interpreted, he indicated something quite interesting for the problem at hand: different researchers interpret integrated water resources management in a variety of ways that are out of touch with the intended meaning of the concept as defined by international organisations (Pers. Comm. M. Claassen, 28 November 2014). For instance, integrated water resources management is for the Global Water Partnership (2014) '…a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.' For the United Nations Educational, Scientific and Cultural Organization, integrated water resources management is 'a holistic approach that seeks to integrate the management of the physical environment within that of the broader socio-economic and political framework' (UNESCO 2009: 2 cited in Claassen 2013). For Lenton and Muller (2009: 13): '[Integrated water resources management] is an approach rather than a method or a prescription, 'and there is no "magic bullet" for all situations.' Lenton and Muller (2009) go on to say that integration is not the end result; integration is rather the approach to address problems. What is more, 'water management does not have an end point and will continually have to respond to new challenges and opportunities' (Lenton and Muller 2009: 13).

What the latter researchers are saying about the continuation of integrated water resources management is exemplified in the schematic above. What is not explicitly present in the schematic are people and how people interact with the resource and the ecosystems 'producing' water. This is in my opinion one of the biggest drawbacks of integrated water resources management; the positivist and, thereby absolute objective, management of a resource that is not only relentlessly in a state of flux, but is constantly being interacted with by people and other living organisms. So-called objectivity and rational planning exemplified in Fig. 1.1 ignores people because methodologically and epistemologically people need to stand back, observe the environment, make sense of it and come up with the best way of managing the environment and its resources. It is as if there is a tendency with integrated water resources management to argue that to investigate how people interact with the resource will dilute objective reasoning. The vision of objectivity becomes 'disinterested' (e.g. Clarke 2009; Springer 2012) in elements within the environment itself.

1.3.3 Transboundary River Cooperation

This disinterested way of looking at human interaction with water is also true for the ways and means promoted to foster cooperation in transboundary rivers, especially in developing regions. The Stockholm International Water Institute is a proponent of neoliberal institutionalism, which the Institute exemplifies in cooperation with basin states (the case study on the United Nations Development

Programme [UNDP] gives ample evidence of this). For neoliberal institutionalism, states, together with international organisations, like the United Nations and the World Bank, are influential actors in international politics. For neoliberal institutionalism there is no distinction between the domestic and foreign domains, both are interdependent (Stone 1994; Stern 2000). Neoliberal institutionalists, furthermore, emphasises states and the inter-governmental organisations, like the Global Water Partnership and United Nations, they create to manage their relations towards deeper cooperation (Nel 1999; Du Plessis 2000; Meissner and Ramasar 2015). In earlier work, we argued that: 'Within transboundary river basins… there is an implicit acknowledgement that neoliberal institutionalism is the foundational theoretical outlook giving prescriptions' (Meissner and Ramasar 2015: 670). The Institute is adamant that the power asymmetry in transboundary river basins rests on a neoliberal institutionalist assumption. From this point of view, greater symmetry in power relations between actors 'will' lead to equitable and sustainable outcomes in transboundary rivers. One such way of getting the symmetry right, is to build capacity within institutions (Zeitoun and Jägerskog 2011) as a stepping stone towards deeper cooperation. It is interesting to see how outcomes from certain processes are put in the form of a rule. Power symmetry 'will' lead to equity and sustainability, which is in the form of a myth. How does the Institute know this? Has it looked at river basins where the power symmetry thesis is applied? In my opinion, it did and it had found that power symmetry lead to 'good' outcomes. The question is, how did it investigate the power symmetry thesis? Was it done in a rational manner replicating the science of other researchers or were assumptions put forward and then verified? In both cases, it is not impossible that the Institute would have found the same results from previous research or that the assumptions are true over a number of researched case studies.

Water research scientists is known for replicating ontological, epistemological and methodological aspirations held by 'pioneers' in a research field like transboundary river cooperation. I unearthed this replication in the South African context when I investigated the water security of transboundary river basins in Southern Africa. In the mid-1990s a number of engineers from the South African Department of Water Affairs and Forestry (DWAF) wrote a few papers on cooperation in the river basins South Africa shares with its neighbours (e.g. the Incomati, Limpopo, Maputo and Orange Rivers) (Conley 1995, 1996; Conley and Van Niekerk 1997). South African International Relations specialists followed suit and developed a number of studies on transboundary river cooperation and water security in Southern Africa (e.g. Turton 1997; Van Wyk 1998; Meissner 1998). In a sense, the specialists took on board the ideas and methods of the engineers especially when investigating the ontological aspect of transboundary river cooperation. These studies were, like the studies initiated by the engineers, conducted from a state-centric and positivist research paradigm (Meissner 2016). The engineers' and International Relations studies focused a lot of attention on the treaties between the states sharing the transboundary river basins.

This liberal institutionalist theoretical disposition is also exemplified in the believe by other promoters of the thesis of transboundary water cooperation that

treaty mechanisms in transboundary river basins can reduce the potential for conflict among basin states. This reduction is achieved by strengthening collaboration and making states accountable for changes in their portions of the river basins shared with other states (Green et al. 2013). At the global level, Scholz (2008) argues that water policies and politics are influenced by global governance processes, especially those practices found in the arenas of climate change and biodiversity. These fields contain opportunities for linking national water polices and global policies. The processes are also based on interventions by multiple actors at the local, national and global levels. The aspects mentioned in this short description of transboundary water cooperation and national water policies and water politics, are based on a number of neoliberal institutionalist assumptions. For instance, the theory, notes that the national and global levels are interdependent; what happens in the one will affect actors in the other.

1.4 Rethinking Inquiry in the Water Sector

What the brief discussion on acid mine drainage, integrated water resources management and transboundary river cooperation shows is that scientists have a disposition towards certain research paradigms and theories guiding scientific endeavour. The way these three issues are portrayed indicates a kind of 'philosophical isolation' through 'disinterestedness'. This type of philosophical conduct has an inhibiting influence on the type of science (Sabaratnam 2015: 3) needed to bring people back into the fold of water resources management. This is not to say that the research is not at all connected to the real world. Science is after all practiced by people and groups at a large number of research institutions across the globe. Nevertheless, science and research differ from context to context and institution to institution with different norms as well as patterns of behaviour (Ziman 2001). Even so, we need to divorce ourselves from the notion that we are dealing with an inanimate object (water) and an objective reality (ecosystems), and to move closer to the 'reality' that people interact with water and ecosystems. To change our point of view requires a different type of behaviour and norms when conducting research on water resource management whether integrated or transboundary.

Related to this new perspective, there is much attention on paradigm shifts within the global water research sector (e.g. Warner 2000; Pahl-Wostl et al. 2011; Siebrits et al. 2014; Kolver 2014). My intention is not to investigate the viability of such a paradigm shift, or to propagate the shift from one research paradigm to another. There are numerous research paradigms to choose from (Guba 1990; Ponterotto 2005; Lincoln et al. 2011) and to go into the arguments of moving from one paradigm to another is in my opinion a futile exercise. It is fruitless because people are not easily convinced to follow a new paradigm. There will always be resistors to change. The business sciences are replete with the description of why change in business organisations fails and resistors to change are a major factor (e.g. Kotter 1995; Piderit 2000; Varkey and Antonio 2010; Thomas and Hardy

2011). There will always be detractors from the newly recommended paradigm, and rightfully so. Science, and innovation in science, suffers if there is no critical appraisal of new developments. Even more significant is that, from a practical perspective, it is possible that practitioners are already utilising one paradigm or another without knowing they are. I am convinced that old habits die-hard and it would be a waste of time, I feel, to go to practitioners and 'sell' them a new paradigm.

Later on in the case study section, I argue that research paradigms and theories have a constitutive role in policies, plans and programmes. I also argued that positivism is not the only 'legitimate' research paradigm producing knowledge and constituting agency. Sceptics to the last statement would argue that the foundation of the social sciences would not be possible without positivism, since positivism is playing such an influential role in the social sciences. This might be so, but we need to remember that although the social sciences may have been influenced by positivism, it does not mean that the social sciences' progression has to be restricted by this argument. Knowledge generation that includes the integration of other research paradigms is possible and could become the likely course of action in the future. It is also important to remember that the metatheoretical assumptions that inform recommendations in policies, plans and programmes also need consideration. Knowledge generation through research paradigm integration is ontologically, epistemologically and methodologically possible. With these possibilities comes the promise of expanding horizons of inquiry in the water sector. Having said this, how can the water sector benefit from such an integrated research agenda?

Positivism will remain influential in the water sector for a long time to come. Positivism has been, after all, the driving force behind water research in the South African water sector since the establishment of the Water Research Commission in 1971. Some of the researchers with a positivist background also did work on social scientific issues through a positivist lens. Examples of these researchers are Ashton (2007), Rogers et al. (2000), Roux et al. (2009), Pollard and Du Toit (2008), Schulze (2011a, b) and Stuart-Hill and Schulze (2010). It is also no coincidence that these researchers are all natural scientists that had been implicitly or explicitly schooled in the scientific method. Because of positivism's position in water research, it would be fruitless, in my opinion, to overturn positivism and replace it with other research paradigms (postpositivism, interpretivism/constructivism, critical theories and the participatory paradigm). Positivism is here to stay because many water researchers have and are receiving their education informed by the paradigm. Even so, other research paradigms are gaining traction among water researchers and water practitioners as they communicate with their social science counterparts and get research methodology training at tertiary level. Because of positivism's prominence and the other research paradigms becoming increasingly visible, it would be much wiser to engage with positivism on a productive manner. In what follows, I will outline what I mean by such a productive engagement.

1.5 Critical Solidarity

Before going into more detail, I would like to say something about the concept 'productive'. It is important to say what I mean by the term 'productive' so that there are no illusions about its meaning in this context. To be 'productive' means to make something, or grow foodstuffs, doing and or achieving a lot, and cause something or produce a result. To be 'productive' implies that one is moving forward with leadership (OALD 2013). To engage with positivism means to be innovative in thinking and to use innovative ways of producing or causing something new. This 'something new' could be a new way of investigating an issue and also a new way to understand an issue or problem. I am of the view that a new and deeper understanding of an issue holds the potential to stimulate innovative ways of dealing with water issues. The reason for this is that by integrating alternative theories with the theories on which a policy, programme or plan is based, reduce the blindspots and open new horizons for looking at aspects. These new horizons could give clues to the new direction one can take in creating an opportunity or ameliorating a problem. We need to expand horizons and blaze new trails.

To expand horizons and blaze new trails in water research, I am proposing to take a critical solidarity stance when dealing with dominant research paradigms, like positivism. What is meant by critical solidarity? To explain this, I will firstly unpack the meaning of solidarity before moving on to its particular nature.

Solidarity is more than mere sympathy or empathy. Solidarity is founded on an emotional and intellectual (complete) understanding of the 'parallels in the logic of the One and the Other' (Plumwood 2002: 205). Putting it less abstractly, solidarity means that one should stand with the other in a supportive relationship. Plumwood (2002: 202) states that: 'Solidarity requires not just the affirmation of difference, but also sensitivity to the difference between positioning oneself *with* the other and positioning oneself *as* the other.' To position oneself *with* the other, it is necessary to take the attitude of a traitor, so to speak (Scholz 2013). In other words, if the research paradigm one favours is interpretivism, then one should be against a move to overturn positivism and replace it with interpretivism. One should therefore be in opposition of such a mono-paradigmatic move. In addition to adopting this traitor identity (e.g. Plumwood 2002), it is also necessary to take an epistemological and political reoriented stance to recognise the existence of the agency and ability or potential of the other to communicate effectively (Plumwood 2002; Scholz 2013).

According to Kennedy (2013: 32) solidarity is not only about principles but also about passion. In this regard, it is about recognising 'one's fellow.' To turn this solidarity into critical solidarity, the notion of solidarity need to be expanded and refined with an understanding of the differences between oneself and the other (Maruggi 2012). Said differently, there should be support research paradigm's scientific endeavours, but also enough distance to represent the interests and needs of practitioners as well as to critique the research paradigm's metatheoretical assumptions and domination in qualifying policies, programmes and plans (e.g. Wink 1998; Sturm 1996–1998).

It is by recognising other research paradigms and theories as legitimate knowledge generators and inform agency that water researchers will be able to discover new inquiring paths. This does not only apply to research scientists that adhere to positivism, but to scientists that put forward any other research paradigm as the only means of generating knowledge and informing agency. Later I will argue that a disdain for research paradigms and theories are unproductive. Research paradigms and theories play important roles in the natural and social sciences. Not only are these cognitions windows on a complex world, they are also causative elements in how knowledge is generated and agency influenced. Because research paradigms and theories give valuable perspectives of the real world, they are variables closely tied to the policy process.

How could water researchers benefit from critical solidarity? The statement that sympathy and empathy is not enough for critical solidarity implies that sympathy and empathy are good foundations for a critical solidarity attitude. In this regard, sympathy should be seen as the *act* of supporting or approval of an idea, a cause or an organisation. Sympathy also entails friendship and understanding between people with similar interests and opinions (OALD 2013). Water research scientists share an interest and opinion on the state of South Africa's water resources—the quality is deteriorating fast or has, in certain instances (e.g. the Olifants River) deteriorated to such an extent that it compromises environmental and human health. The quantity of South Africa's water resource is another shared perception—South Africa is a water scarce country. This is where consensus ends; scientists promote different and differing initiatives to deal with these situations. It is in this arena of suggested policy initiatives that critical solidarity can play a constructive role.

In the opening pages of this chapter, I referred to a number of international organisations (e.g. the Global Water Partnership, the Stockholm International Water Institute and UNESCO) that support and propagate integrated water resources management and transboundary river cooperation through empiricism and neoliberal institutionalism, respectively. From a sympathy perspective, I support and understand why these organisations are arguing from the premise of these theories. The human condition needs improvement and if an organisation can show its worth in promoting ways and means to do so, then so be it. I am not interested in which reason comes first, or what the independent variable is in arguments. I am interested to see how the organisations generate knowledge and influence agency. I am merely saying that I understand why the organisations are arguing the way they do. By doing so, I am supporting why they are doing it. This goes for the various South African water researchers too.

Empathy is about the ability of one person to understand another person's feelings or experiences (OALD 2013). Feelings refer to psychological aspects like emotions. Throughout the investigation I will allude to emotions and also argue that research paradigms and theories are cognitions. For me, people could adhere to a specific research paradigm and theory for a number of reasons. Working with a particular research paradigm and/or theory over an extended period of time could create an emotional attachment between a scientist and the research paradigms and/or theory. It is not impossible that a scientist could develop an affinity towards a

particular paradigm and/or theory. This affinity boils down to a commitment to the adherence of the scientist to the metatheoretical and basic assumptions of a research paradigm and theory, respectively. A possible source of this ontological affinity could be a link between the seeking of a way to explain aspects in the scientist's field of expertise and the research paradigm and/or theory's assumptions. Should the scientist be looking for a way of explaining phenomena or the occurrence of issues in her or his subject field, and a theory is a close fit to it, an affinity to the theory could develop.

This argument is a conjecture at best. Later I will outline a theory of water research. Suffice to say and arguing from the theory of water research, one could argue that conformity with certain research paradigms and theories does not always boil down to rational choice. Conformity is, after all, behaviour following accepted rules (OALD 2013). Taking this definition of conformity into consideration, it is probable that those above-mentioned organisations are behaving in a way that is in line with the accepted norm or standard of appropriate behaviour along liberal prescriptions within the international system. This conformity trickles down into the domestic sphere when governments adopt the prescriptions as a foundation of their water policies, programmes and plans.

Based on the aforementioned about feelings of affinity, in particular, and emotions in general, I contend that the link between the affinity towards research paradigms and theories shared by groups goes much wider than the individual affinity towards the research paradigm and/or theory. According to Mercer (2014: 515): 'People do not merely associate with [paradigmatic and theoretical like-minded] groups…, they can *become* those groups through shared culture, interaction, contagion, and common group interest. Bodies produce emotion that identities experience: group-level emotion can be stronger than, and different from, emotion experienced as an individual; group members share, validate, and police each other's feelings; and these feelings structure relations within and between groups… Emotion goes with identity.' Following this, it is likely that affinity or conformity to a specific paradigm and/or theory, linked to a specific group of scientists, could inform the identity of individual scientists. Deviation from the specific research paradigm and/or theory is likely to be discouraged through the policing and enforcement of sanctions by other scientists in the group. This could also discourage the adoption of alternative research paradigms and/or theories that are not in line with current group thinking. Beliefs such as credibility in the ontological and epistemological infallibility of research paradigms and/or theories are strengthened and constituted by emotions (Mercer 2010).

Bringing emotions into the fold, and due to their influence in strengthening group beliefs in certain research paradigms and/or theories, we are confronted by a dilemma regarding the application of critical solidarity. After all, solidarity is based on emotional understandings of the logical parallels of the one and the other. This is not an insurmountable dilemma because of a supportive relationship propagated by solidarity and the intellectual understanding of the logical parallels of the one and the other. We can overcome the dilemma through the legitimate recognition of the five paradigms (positivism, postpositivism, interpretivism/constructivism, critical

theories and the participatory paradigm). By recognising the legitimacy of all the research paradigms, it is possible to argue that not one research paradigm is correct. This brings in the intellectual understanding that the metatheoretical assumptions of the research paradigms are all relevant in the construction of knowledge and the constitution of agency. In other words, should a research paradigm be viewed as the only legitimate way of helping scientists in their ontological and epistemological endeavours, a narcissistic attitude is at the order of the day and the traitor attitude could be hard to foster with a weakening influence on critical solidarity.

Narcissism is a personality characteristic that encompasses arrogance, entitlement, a fragile self-esteem, grandiosity, hostility and self-absorption. People suffering from narcissism have a grandiose belief system and are usually motivated by a need for power and admiration or dreams of glory instead of empathetic concern for others (Rosenthal and Pittinsky 2006; Post 2014). Narcissism is not only a personality trait affecting individuals. There also exists a group narcissism that is a sublimation of individual narcissism. In this case, individuals satisfy their own narcissistic tendencies by belonging to, and identifying with a particular group (Fromm 1973; Emmons 1987). In this regard, there is a leader-follower relationship; 'followers feel incomplete unless they are attached to a greater other' (Post 2014: 475). It is not impossible that people, in the role of followers, could feel more complete when adhering to, and propagating, a dominant research paradigm and/or theory that would bring them entitlement, grandiosity, power and admiration in the group. In such a situation it would be quite difficult for someone to take on a traitor attitude necessary for the implementation of critical solidarity.

Narcissism and empathy are strange bedfellows. Because empathy is one of the building blocks of solidarity, and by implication critical solidarity, a narcissistic attitude would be counter-productive in the constitution of critical solidarity's thinking. This means that critical solidarity will not happen overnight within the South African and water research sectors. Even so, it is my hope that PULSE^3 and a critical solidarity attitude will foster an attitude of respect for other research paradigms and theories as legitimate cognitive products.

The traitor attitude propagated by critical solidarity should be underpinned by an attitude of learning through empathy. Both empathy and learning are mutually constitutive; the one does not necessarily cause the other but feed on each other. Let me explain what I mean by this. If one reads or analyses a text in an empathetic manner and, at the same time, with a learning attitude, it is likely that one would realise where the author comes from regarding her or his research paradigm or theoretical disposition. This lifts the proverbial Hobbesian veil of ignorance and gives greater insight into the underlying argument contained in the text.

For instance, in the cases studies, I noted that the dominant research paradigm or theory underpinning the policies, programmes and plans is not incorrect at all. Instead, I argued that the dominant research paradigm had taught scientists a lot about the issues at hand and how the issues had been addressed or are being addressed at the moment through the same research paradigm. The useful insights that research scientists have generated over the years, encompass empathy to the

way in which they did research around the issue. This empathetic stance also opens the possibility to look into those insights and learn from them.

1.6 How the Rest of the Book Unfolds

I structure the book as follows. In Chap. 2, I will present three case studies to demonstrate what I deem to be wrong with the way research is conducted in the water sector. The first case deals with climate change adaption strategies for municipalities. I compare the knowledge generation and agency outlined in two strategies: one for South East Queensland in Australia and one for South African municipalities. I present this case study on climate change adaptation strategies because it deals with the local or provincial tier of government in two different states. This comparison gives insights on how researchers in different political and socio-economic contexts frame research of, and, in a highly technical field. What is more, climate change relates directly to water resource management because the climate is a critical variable influencing the quantity of water available to a human population. In South Africa many municipalities are water service authorities responsible for water treatment and water purification and distribution. In this regard, the case study is apt. The second case investigates how government officials and consultants developed South Africa's National Water Resource Strategy, Second Edition. In the third case study, I investigate and report on the United Nations Development Programme's Water and Ocean Governance focus area. The three case studies represent a logical progression from the local level, up to the national and through into the global level of climate and water governance. At the end of the case studies, I will present an overview of the challenges I uncovered and indicate how my alternative approach to research will address these challenges.

In Chap. 3, I outline a theory of water governance. I call this theory active substantiation and with the theory I explain why the current state of the art of water research is limited and limiting. In Chap. 4, I outline and explain the PULSE^3 framework for analysis and its components: the research paradigm assessment, the ethos of analytic eclecticism and the theories for practice. Chapter 5 deals with research paradigms and theories to show why my alternative approach to water research and policy makes sense. With Chap. 6, I summarise and draw some conclusions.

1.7 Conclusion

There is predominance among South African research scientists to investigate water governance and management from a particular research paradigm. Water research in South Africa has a tendency to follow positivist or empiricist scientific

epistemologies, ontologies and methodologies. Much of the research is dominated by natural scientists, and where social scientists are involved they are influenced by their natural science counterpart's positivist views and methods. What is more, there is a bias towards myths in water research that goes unquestioned. These myths have developed over the years in the international and domestic water research domains. We see the use of slogans with water footprinting, acid mine drainage, integrated water resources management and transboundary river cooperation. Through the use of myths, water footprinting, for instance, is connected with company practices that need to be initiated for water resource management to be 'good and proper'. The same goes for integrated water resources management that need to be implemented in a specific manner, especially in developing countries, to 'maximise' 'essential and good' processes. Even so, it is not enough to only investigate and critique myths connected to such issues. The foundation of such an investigation and problematisation lies in an alternative myth about the nature of science. If we view science not as dogmatic assertion, but as constant critique, we will be able to unshackle our predetermined thinking when we identify slogans in theories. By investigating how and who should address the problems around acid mine drainage gave us a glimpse as to what other issues we are dealing with apart from technical and financial solutions. Ethics, unwittingly, also plays a role, but is not explicitly mentioned and thereby the wider societal dimension is not 'seen'. This implicitness in covering the societal aspects of a problem lies partly in the utilisation of certain social scientific research paradigms and theories that are not known to natural scientists.

What I am trying to say is that we should not rethink the content of our research products, but we should critique ourselves, those with power in the scientific community and their ontologies, epistemologies and methodologies. I developed critical solidarity as a means to connect the critique I pose towards predominantly positivist myths with an alternative view when dealing with dominant research paradigms and theories. To engage with dominant research paradigms, and problematise them in a constructive manner, requires an emotional and intellectual understanding of the reasoning between dominant research paradigms and theories and there alternative counterparts. I formulate critical solidarity as a way to resolve the tension between research paradigms that stand opposed with each other in a kind of constant tug o' war with no ultimate winner. This continual back and forth arguing with no winner rests on the notion that all research paradigms and theories are legitimate ways to create knowledge and inform agency in the water research sector.

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Chapter 2
Water Governance and Management and Climate Change

2.1 Introduction

In this chapter, I will present three case studies to indicate how research on water governance and management as well as climate change is influenced by the utilisation of research paradigms and theories. I also indicate how research paradigms and theories influence policy recommendations. The first case is an investigation of climate change adaptation strategies in Australia and South Africa, with particular reference to South East Queensland and South African local government structures (i.e. municipalities). Climate change is indirectly related to water governance and management, but a salient issue when conducting strategic water resources planning. The second case study deals with the Department of Water and Sanitation's *National Water Resource Strategy, Second Edition*. The last case study investigates the United Nations Development Programme's Water and Ocean Governance focus area. The purpose of presenting the cases is, furthermore, to give an overview of the challenges related to research in these domains. At the end of the chapter, I will show how my alternative approach, to research in the water domain, will address these concerns. I end with a conclusion, wherein I introduce the following chapter based on the challenges I uncovered during the analyses.

2.2 Climate Adaptation Strategies in Australia and South Africa

Although not directly linked to research on water resources, the issue of climate change has the ability to influence global water governance processes and has the opportunity to link national water policies and strategies with global policies (Scholz 2008). It is for these influencing and linkage reasons that I include climate change adaptation strategies as a case study. According to the Intergovernmental

R. Meissner, *Paradigms and Theories Influencing Policies in the South African and International Water Sectors*, DOI 10.1007/978-3-319-48547-8_2

Panel on Climate Change (IPCC) (2007), in biophysical terms, climate change is the change, over time, in the averages and variability of surface temperature, precipitation, and wind and related transformations or changes in the Earth's atmosphere, oceans, water resources, snow, ices, land, ecosystems as well as living organisms (plants and animals). This definition puts exclusive attention on the biophysical environment. Yet, climate change also has a social component.

Climate change has come to dominate social, political and economic agendas. The issue is so pervasive that it is unthinkable to have a conversation about the environment without ending up talking about climate change, its causes and how it might or will impact the natural environment and human society. Because of its salience, societies at all levels, from the individual to the communal and governmental, are giving serious consideration to climate change and its ramifications. Adapting to, and mitigating the consequences of climate change, have spawned numerous technical and societal efforts, reports, plans, programmes and treaties. How we produce research on climate change, its impact and our responses to it, is the central feature I will be discussing in this case study. My framework for analysis is PULSE^3 (people understanding and living in a sustained environment). The two documents I will analyse using PULSE^3 are; *Adapting South African Cities and Towns: A Local Government Guide to Climate Change Adaptation Planning* by Ziervogel and Methner (2009) and *Climate Change Vulnerability in South East Queensland: A Spatial and Sectoral Assessment* by Choy et al. (2010). Another reason for this choice in material came from a project a research group at the Council for Scientific and Industrial Research (CSIR) conducted for a South Africa metropolitan municipality. The research group approached me to conduct an analysis of the two case studies because municipal officials approached the group and asked for a comparison between the Australian and South Africa. The choice of the case studies therefore has a pragmatic angle. I, therefore, picked these two adaptation strategies because of their linkages to local government structures in two different political settings.

The purpose of the CSIR research project was to develop a climate change adaptation plan for the municipality. To get a sense of what such an adaptation plan entails, the CSIR researchers investigated similar research conducted in a South African and an international context. It was for these reasons that the two reports were selected. In other words, they fit the work description the CSIR researchers embarked upon for the municipality's study. The report by Ziervogel and Methner (2009) had an uncanny resemblance with the terms of reference of the commissioned research for the metropolitan municipality. The research project manager subsequently requested the analysis of the two reports. The purpose of which was to investigate the way in which research scientists generate knowledge around the issue of climate change and adaptation and how they frame recommendations to officials at local government level. An analysis of this nature, gave important insight on how to develop the commissioned adaptation plan for the metropolitan municipality.

2.2.1 Climate Change Assessment and Adaptation

The assessment of climate change involves the risks and vulnerabilities faced by society and communities in light of the potential effects of climate change. It is important to assess vulnerabilities, since it is an attempt to define the scale of a threat. With a vulnerability assessment, the research scientist and policy maker can also start determining the (effective) means of 'promoting remedial action to limit impacts by supporting coping strategies and facilitating adaptation' (Kelly and Adger 2000: 325). An assessment, thus, involves the mobilisation of resources to deal with potential threats at different scales and, as such, it is part and parcel of the policy process. Adaptation does not only have a physical or ecological dimension. There is a human dimension too, where people have to make adjustments to the availability of resources (of whatever form) and risks at various spatial, societal (Adger et al. 2005) and temporal scales. Scientific knowledge has, over almost three decades, played a significant role in the formulation and implementation of policies to curb climate change impacts (Füssel and Klein 2006). That said, and since humans are an integral part of vulnerability assessments and adaptation plans (e.g. John et al. 2015), it also follows that the way in which we generate scientific knowledge influences policy adaptation plans and their implementation. The type of research paradigm a scientist uses to generate knowledge and develop recommendations (agency) is central to problem conceptualisation recommendation implementation.

2.2.2 Paradigm Assessment of Adapting South African Cities and Towns'

The *Adapting South African Cities and Towns: A Local Government Guide to Climate Change Adaptation Planning* by Ziervogel and Methner (2009), outlines a number of steps municipalities should take to adapt to climate change. The six steps are (1) create a coordinating adaptation committee; (2) assess current climate trends and future projections for the municipality; (3) undertake a climate vulnerability assessment; (4) undertake an assessment of adaptation options; (5) develop a municipal adaptation plan; and (6) monitor, evaluate and adjust the interventions on an ongoing basis (Ziervogel and Methner 2009).

The steps are preceded by an explanation of why the practical guide is necessary; the promotion of robust adaptation to climate change in the context of sustainable development. The authors note that: 'An adaptation strategy should be a systematic, proactive and coordinated response to enhanced climate variability and projected climate change. [The adaptation strategy] refers to the overall process that guides… [the municipality's] planning and decision making for a sustainable future' (Ziervogel and Methner 2009).

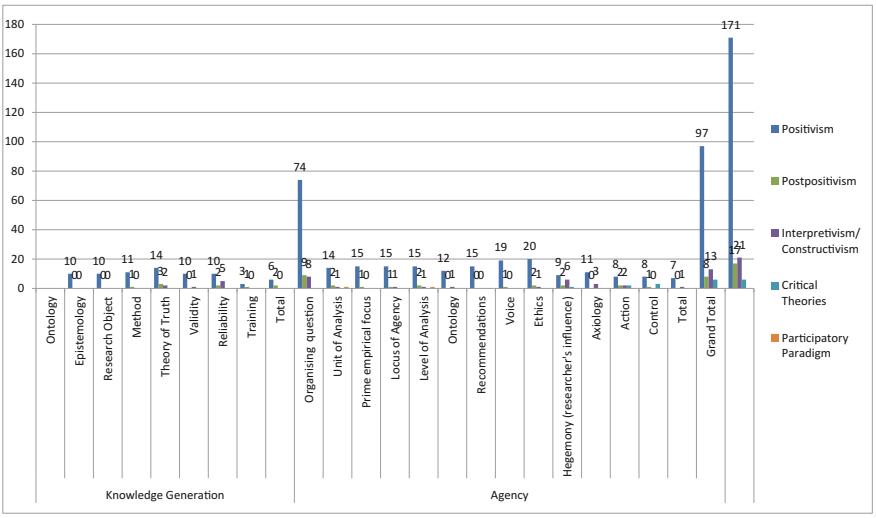


Fig. 2.1 Paradigm assessment of the Ziervogel and Methner report

2.2.2.1 Knowledge Generation and Agency

Figure 2.1 represents the paradigm assessment of the guide.[1] The diagram indicates that the dominant research paradigm used to generate knowledge is: positivism. There are also elements of post-positivism, interpretivism, critical theories and the participatory paradigm present in the strategy's development. An assessment of the author's training could explain why this is the case. Ziervogel scores high on the positivism and post-positivism research paradigms, while Methner's training profile shows a mix of positivism, post-positivism, interpretivism and the participatory research paradigms. The critical theories research paradigm is absent in both cases. Also, the topic dealt within the guide is of a positivist and possibly post-positivist nature. I will elaborate on this statement very briefly.

The climate change discourse is framed with science in mind. For instance, scientists talk about '[t]he science of climate change…' (Doulton and Brown 2009: 191); '[d]espite the overwhelming scientific consensus that humans are influencing the planet's climate…' (Ladle et al. 2005: 231) and a study '[r]epresent] the first major global assessment of climate change science in six years (Jarraud and Steiner in Solomon et al. 2007). These quotes indicate that climate change is discursively linked to the scientific method. It can also be argued that

[1]There is a major difference in the scoring between the two documents. The reason for this is that I did the assessment of the entire *Adapting South African Cities and Towns: A Local Government Guide to Climate Change Adaptation Planning* and only the executive summary of the *Climate Change Vulnerability in South East Queensland: A Spatial and Sectoral Assessment*. The length of text one assesses has an impact on the scoring of the text; the more text one assesses, the higher the scores and vice versa.

climate change has become synonymous with the scientific method, which, in turn, is infused with positivism. This is seen in Ziervogel and Methner's (2009) guide where knowledge generation follows positivism. The metatheoretical assumption on the method they used scored the highest (14) of all the categories under knowledge generation. This was followed by the research object (11); ontology, epistemology, theory of truth and validity (10), and training (6). Reliability's score of 3 was the lowest. This is not to indicate that the study, or the method they used, is unreliable. The publication is a guide, and not an assessment of vulnerabilities, which explains reliability's low score. In short, they used the positivist knowledge of climate change to inform municipal officials.

Ziervogel and Methner (2009) followed a specific method in presenting the six steps. The steps are outlined in a seemingly logical dyadic order. They are also clear about their views on adaptive municipalities. For instance, they note that: 'An "adaptive" municipality: takes proactive steps towards reducing the vulnerabilities and risks associated with climate variability and climate change' (Ziervogel and Methner 2009: 4). They go on to say that adaptive municipalities follow 'a coordinated and integrated approach', which is based on the latest climate information' (Ziervogel and Methner 2009: 4). Such municipalities also monitor their strategies on a constant basis (Ziervogel and Methner 2009). These are very specific and to the point statements indicating what exactly is meant by 'adaptation' within a local government setting. In terms of agency, Ziervogel and Methner (2009) indicate through these statements that they control the research process without any inputs from municipal participants (Guba and Lincoln 2005; Lincoln et al. 2011). The voice of the scientists is therefore dominant, with policy makers being informed by the scientists (Lincoln et al. 2011).

In terms of voice and recommendations, these scored the highest and second highest in the research paradigm assessment's agency component (20 and 19), respectively. This was followed by: the unit of analysis, prime empirical focus, locus of agency and ontology (15); organising question (14); level of analysis (12) and the hegemony or the researchers' influence (11). Agency therefore resides with the researchers in a top-down manner, where the scientific method is directing municipal officials on how they should be implementing climate change adaptation strategies.

The recommendations they made are also predominantly positivist. For instance, they list a number of vital lessons from municipalities that have developed adaptation strategies. The actors involved in the implementation of these lessons are: political leaders or champions within the municipality, local research institutions, coordinating adaptation committees and, lastly, stakeholders (Ziervogel and Methner 2009). The locus of agency is therefore top-down, with the level of analysis being systemic. For Ziervogel and Methner (2009), municipal officials and top political leaders are the most important actors that should actively govern to bring benefits to citizens. Said differently, it is a case of 'who governs, and who benefits' (Hobson and Seabrooke 2007), with political leaders and government officials governing and citizens benefitting. The authors of the strategy also do not ignore ideational entrepreneurs like researchers and climate change scientists. For them a direct and cooperative link between those who govern and those with the

necessary skills and knowledge regarding climate change, should be created and sustained, in order to maximise the benefit for citizens.

2.2.3 *Paradigm Assessment of Climate Change Vulnerability in South East Queensland*

Choy et al. (2010) produced the *Climate Change Vulnerability in South East Queensland: A Spatial and Sectoral Assessment* as part as the South East Queensland climate adaptation research initiative. This plan was a partnership between the governments of Queensland and Australia, Griffith University, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the University of the Sunshine Coast and the University of Queensland. The aim of the enterprise was to provide research knowledge to permit the Queensland region to prepare and adapt to climate change impacts. From this undertaking, adaptation strategies to assist decision-makers in industry, government and the community were developed (Choy et al. 2010). The report by Choy et al. (2010), concluded the first phase of the project. It contains a regional assessment of human settlement vulnerability to climate change at spatial and sectoral levels.

2.2.3.1 Knowledge Generation and Agency

I analysed only the executive summary of the report since this part of the report was an excellent rendition of the entire manuscript and contained all the relevant information of the study, including the methodology. The research paradigm that is central throughout the work is positivism (see Fig. 2.2). Positivism is dominant in both the knowledge generation and agency portions of the executive summary. Interpretivist/constructivist elements and the participatory paradigm are also present. Regarding knowledge generation, the scientists used an integrated framework. This structure included external (or exposure) and internal (or sensitivity) and adaptive capacity dimensions of vulnerability. The authors note that this approach was chosen because it was the most common avenue used in global environmental change and climate change research (Choy et al. 2010).

In terms of the method utilised, the team of scientists assessed the region's vulnerability to three impacts: extreme heat, extreme rainfall and coastal hazards. They based these severities on a set of indicators (Choy et al. 2010). For the scientists, the research object and the associated ontology and epistemology are positivist because the Queensland region has inherent qualities existing dependently of the researchers. The impact of climate change on Queensland can, therefore, be investigated from a distance and in an objective manner Lincoln et al. (2011) through the gathering of empirical data and analysed through statistical analyses or computer modelling.

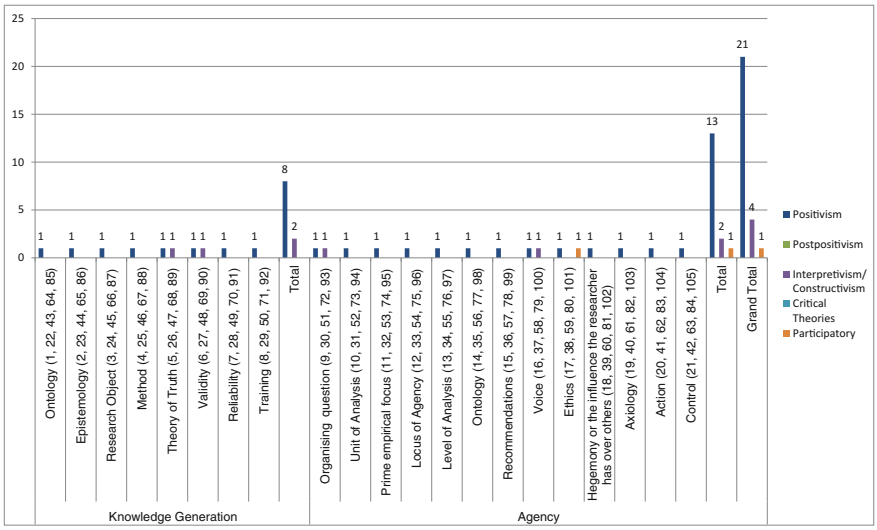


Fig. 2.2 Research paradigm assessment of the South East Queensland report's executive summary

With respect to theory of truth and validity, interpretivist/constructivist elements are present. This is so only in the presentation of the results of the climate change assessment. For instance, the scientists state that: 'In SEQ [South East Queensland], climate change is *projected* to lead to an increase in average annual temperatures, a change in average rainfall and sea-level rise. In addition, more extreme weather events are *projected*, with an increase in rainfall events…' (emphasis added). They also note that: 'Of particular concern are a number of areas within the Sunshine Coast and Gold Coast jurisdictions that *appear* extremely vulnerable to extreme rainfall' (emphasis added) (Choy et al. 2010: i). That the scientists use the words 'projected' and 'appear' is an indication of the uncertainty inherent in climate change modelling and the effects on the environment. Climate change scientists are aware of this uncertainty, and are part of their lived-experience leading to defensible knowledge claims and the construction of validity through consensus (Lincoln et al. 2011).

Positivism is also dominant in the treatment of agency or the recommendations the scientists put towards policy makers. The only metatheoretical assumptions from other research paradigms are in the organising question, voice and ethics. The researchers report on local authorities that have been proactive in '…developing policies geared toward climate change strategies in the last few years despite the fact that there was no statutory obligation to do so' (Choy et al. 2010: i). This is an indication that the local authorities are not in an absolute top-down relationship and has autonomy to construct their own policies irrespective of the central government's involvement or not. The local authorities' actions can be seen as interpretivist/constructivist, since they are acting independently from the regulatory

environment; they don't wait for legislation to tell them what to do. The scientists bring their voice to bear on planning practices. Here they say that: '…the analysis of the current planning schemes illustrates that adjustments will need to be made in order to improve planning practices' (Choy et al. 2010: i–ii). The scientists are acting in an activist role calling for the improvement of planning processes. They put forward adaptive management 'to deal with uncertainties and evolving climate science, better cross-scalar and cross sectoral integration in the policy delivery process' (Choy et al. 2010: ii). While employing their voice in an interpretivist/constructivist manner, the scientists advocate for the utilisation of a positivist theory, adaptive management, to advance policy planning and scientific knowledge. From an ethical point of view, the research process is aimed at revealing special problems faced by human settlements in light of climate change. This is the only element from the participatory paradigm. The reason for this could be that the report is a product of a participatory initiative between scientists and policy-makers and that the policy-makers highlighted the special problems facing their jurisdiction.

The scientists reported on three sectors where climate change will have impacts: coastal management, the health sector and emergency management. For the three sectors the scientists made explicit recommendations. The use of the word 'will' appear repeatedly. For instance, to reduce '…vulnerability in coastal areas *will* need to consider the identification of sustainable options…' and '[n]ew concepts *will* need to be integrated into local planning schemes…' as well as '…successfully addressing the challenges posed by climate change *will* require an understanding of the complexity of stressors and external drivers on human health…'. The scientists further note that: 'Climate change…*will* bring new challenges to the emergency management sector…' (emphasis added) (Choy et al. 2010: ii). In this regard, the scientists are making their voices heard by informing policy-makers of what 'will' happen if policy makers do not take certain actions in a timeous fashion. The prime empirical focus is to supply order, create and maximise welfare by the political leadership of the Queensland government (e.g. Hobson and Seabrooke 2007). The scientists are therefore directing policy makers through predictions based on their knowledge and epistemic reputation as climate change scientists.

2.2.4 *The South African and Australian Adaptation Plans Through the Lens of Analytic Eclecticism*

From the research paradigm assessment a critical question arises. Are those scientists, with the necessary climate change knowledge and skills automatically the ones that can inform municipal officials on the implementation of adaptation strategies? More specifically, is the positivist paradigm suitable for such an endeavour? Considering that local governments are the sphere of government closest to citizens (Zybrands 2011), in the case of South Africa, it would appear as

if a combination of research paradigms might be more suitable. The human element is central in this relationship because climate change scientists are but one of many stakeholders in the climate debate and discourse; 'ordinary' individuals are also making an impact and having a say in the matter. The ethos of analytic eclecticism will be able to enlighten the questions I ask above, especially with respect to what more is needed to inform practitioners and what factors are also necessary to take into consideration when science informs municipal officials. The two studies are doing well in highlighting the issue of climate change, how it could impact on different government sectors and what to do about such impacts. What they omit, though, are the acknowledgement and integration of other research paradigms. This is evident from the low scores the research paradigms, other than positivism, received. A possible reason for this is that the authors are not aware of alternative research paradigms and, therefore, it is a case of 'out of sight out of mind', so to speak. What I will do in the next couple of paragraphs, is to apply the ethos of analytic eclecticism and the repertoire of theories, from the PULSE^3 framework for analysis, to better understand how knowledge can be deepen and how agency be influenced and better understood at local government level.

Now that we know that positivism is the predominant research paradigm used in both reports, we can move forward and ask what can we do to better inform government officials? I will start with the subject matter: climate change. At first glance, it would appear as if climate change is a straight forward positivist or even post-positivist subject matter. The majority of scientists involved in climate change research are natural scientists and would approach the subject from an empiricist perspective. Even so, if we should move from a post-positivist premise that a single reality can never be fully understood (Guba and Lincoln 2005; Lincoln et al. 2011), it opens the possibility for the application of the interpretivist/constructivist and participatory research paradigms, not forgetting the critical theory paradigm.

From an interpretivist/constructivist perspective, should researchers acknowledge the existence of multiple realities that are cognitively constructed, they might be able to investigate how practitioners view climate change. They might be surprised that practitioners, may or may not, hold the same views as the scientists do since climate change is such a pervasive topic on the social agenda. Alternatively, researchers might realise that they are dealing with so-called climate change optimists (i.e. people believing that climate change is caused by human activities and that climate change is real) and pessimists (i.e. people not believing that the global climate is changing). The views held by practitioners will influence the way in which researchers might want to approach optimists and pessimists during their research. Since the mix between optimists and pessimists are a possibility, researchers engaging in climate research will come into contact with persons holding subjective and objective realities about climate change. These realities are co-created by the human mind and the surrounding environment (Guba and Lincoln 2005; Lincoln et al. 2011). This environment includes large volumes of information from a variety of sources, which may include scientific journals and television documentaries or sources of information that can treat climate change in a topical manner; news outlets and electronic media are examples. The practitioners might,

however, not hold the objective reality of human-induced climate change at heart. They are free from this scientific objectivity (Heshusius 1994; Lincoln et al. 2011), which could put the objective scientist at odds with the practitioner with no 'objective truth' on the subject matter.

In such an event, scientists usually fall back on their rational science in an attempt to convince the practitioner of the realities of anthropogenic climate change. This creates a power relationship, where influence starts to play a significant role in the working relationship between the scientist and practitioner. Such a situation is akin to two political parties trying to convince voters that their respective pathways to corrective action are correct. Put differently, a knowledge tug-o'-war ensues. This can be a fruitless endeavour with both science and practice suffering; no longer is it about science and practice, but the psychological convictions of the parties and their influencing endeavours. This way of influencing is seen in the step-by-step way Ziervogel and Methner (2009) wrote their guide. The guide puts science at the top, directing practice on how to implement more sustainable practices and policies. The Choy et al. (2010) report on climate change in South East Queensland, follows a similar way of putting science in the service of practice and policy. In this report, the top-down relationship manifests in a number of explicit directives. For instance, the report notes that: 'an improvement in disaster risk assessments and the prevention, preparedness, response and recovery phases of disaster management will be necessary in order to deal with the expanding and changing risks caused by climate change' (Choy et al. 2010: ii).

To get around such a situation calls for the incorporation of methods from the interpretivist/constructivist, critical theories and participatory paradigms. Here interviews, focus groups, deconstruction of text and language, face-to-face learning and the analysis of power structures (Lincoln et al. 2011) could produce much needed information on how practitioners view climate change. This could place the researcher in an emancipatory position and setting. The views of practitioners are like a window on the policy domain they operate in. For instance, governments at all tiers are influenced by the ideology of the ruling party. How government practitioners view climate change is not so much a matter of personal conviction but also of organisational functionalism. By understanding the current ideological undertones of government can help researchers in developing effective recommendations that are likely to have an influence. There is no hard and fast rule to apply, in this regard, but sensing the type of ideology is likely to create a better understanding of the undercurrents in government and how to interact with practitioners. Governments have limited financial and human resources at their disposal to execute policies. This can place enormous strain on government officials to deliver services. The day-to-day functioning of officials is also influenced by multiple tasks to implement programmes within a specific time frame and budget. An understanding of how government officials operate could help fostering higher levels of empathy in scientists when making implicit or explicit recommendations (i.e. exercising agency). A scientist might think twice about a specific set of recommendations when taking such realities into consideration and opt for more realistic guidance in a more participatory fashion.

2.2.5 *Theory for Practice: Social Learning and Policy Paradigms*

What is furthermore telling, is that both reports rely, to varying extents, on a single theory to interpret and direct matters for practitioners. In the case of the South African guide, Ziervogel and Methner (2009) implicitly refer to adaptive management, especially when they outline the criteria of an 'adaptive' municipality, and talk about adaptive capacity and resilience. Choy et al. (2010: ii) refer to adaptive management explicitly when they call for '…planning processes through adaptive management in order to deal with uncertainties and evolving climate science…' Adaptive management has secured a place in climate adaptation because the theory closely parallels frameworks for general climate adaptation (Lim et al. 2005; Ebi 2011; Hess et al. 2012).

Adaptive management is a middle-range, problem solving theory; it identifies the management procedure that practitioners need to follow in order to mitigate climate change and achieve sustainable development and resilience against vulnerabilities associated with climate change. Adaptive management is a problem solving theory (e.g. Cox and Sinclair 1996) because it rests on positivism, takes climate change as a given and recommends solutions to practitioners on how to formulate policies, programmes and plans to mitigate climate change consequences. The practices suggested by adaptive management also calls for certain adaptation procedures like co-learning and the implementation of policy through stakeholder engagement.

The theory of adaptive management highlights a number of factors. According to the theory, systems are complex in their arrangement of stakeholders, relationships and resources. These referents operationalise 'complexity' by deducing that the multiple relationships between the elements cause complexity. The reality of climate change is therefore perceived as complex. As such, the natural and social systems that are influenced by climate change are complex to manage. These systems also hold inherent uncertainty. To cope with complexity and uncertainty it is necessary to emphasis ongoing learning and for this to happen continued stakeholder input is necessary. Stakeholder involvement alludes to democratic principles of transparency and inclusive political processes. In this regard, adaptive management tells us that the only way through which climate adaptation can be achieved is through the rational perception of reality as complex and the invocation of democratic principles (Ebi 2011; Hess et al. 2012).

The adaptive management approach involves a number of primary elements. The first is management objectives that are regularly revisited and revised. This is followed by a model of systems being managed. Third in line is a range of management choices followed by monitoring and evaluation and mechanisms for incorporating learning into future decisions. The last element is a collaborative structure for stakeholder participation and learning. According to adaptive management theorists, adaptive management integrates management and learning instead of separating these (Hess et al. 2012). Proponents of the theory go on to say

that adaptive management is a structured approach responding to uncertainty associated with complex systems management. When applying adaptive management, actions are adjusted in response to feedback towards management objectives. It also entails responding to changes in the context it is being implemented. These changes can be anticipated or not (Eberhard et al. 2009). To reiterate, adaptive management is characterised by structuralism, based on democratic and collaborative ideals and focusses on ecosystems or issues related to ecosystems. From an adaptive management perspective it is also possible to anticipate changes in a system.

In this regard, adaptive management is depicted as a cycle that starts with assessment, moves on to planning and then implementation, monitoring, evaluation and lastly adjustment. Assessment could entail estimations of the likelihood and severity of risks and the gauging of exposure to hazards and associated vulnerabilities. Regarding planning, priorities need to be identified, followed by the formulation of response strategies. Such initiatives need to be implemented and could entail communication of responses and proposals to stakeholders. Monitoring and evaluation requires data that is relevant to expected impacts and interventions and a comparative analysis of events before and after the implementation of interventions. Adjustment takes place based on the outcomes of monitoring and evaluation with a view of changing future conditions as stakeholder input (Hess et al. 2012) (Table 2.1).

Climate change is not an easy problem to deal with because of its global geographical spread that will have different perceived impacts on geographical regions, societies and ecosystems. Because of this, climate change is not a pleasant prospect for society and the scientific community making the problem difficult to understand. This complication has been diminishing as technology and our knowledge of meteorological systems advanced over time. Even so, the geographical spread of the problem, and its asymmetrical perceived impacts, gives rise to the problem's unpleasant character. What is more, it is not certain if, and how, the adaptation and mitigation plans put in place now will bring about the desired results. With respect to uncertainty, the Intergovernmental Panel on Climate Change (IPCC) categorises

Table 2.1 Adaptive management's ontological and epistemological structure

	Concepts	Actors	Independent variable	Interceding variables	Dependent variable	Causal mechanism
	Complexity Resilience Sustainable development Systems Collaboration Adaptation Policies	Stakeholders Government officials	Climate change	Policy cycle Adaptation Mitigation Co-learning	Systems	Realisation that climate change is a real threat to the biosphere and human society
Connections	The policy cycle connects *positively* with adaptation and mitigation in that it is through government intervention that adaptation and mitigation are achieved					
Complementarities	Democratic principles of collaboration and inclusion results in resilience and sustainable development					

uncertainty into three typologies: unpredictability, structural uncertainty and value uncertainty. I will only consider unpredictability. For the Panel (2007: 1), sources of unpredictability are: 'Projections of human behaviour not easily amenable to prediction (e.g. evolution of political systems)' and '[c]haotic components of complex systems.' As we have seen in the two adaptation reports from Australia and South Africa, the uncertainty is mitigated by a believe that the policies humans develop, and put in place now, will have a positive influence to deal with climate change in future. The Australian report was explicit about the effects of climate change on certain systems. This also translates into a belief that climate change is real, and its impacts are not the stuff of 'science fiction'. These beliefs are the main understandings contained in both reports. In this regard, I will argue that the reports base this belief on scientific research already conducted, in other words, empirical evidence, and the pronouncements of experts, especially the Intergovernmental Panel on Climate Change. Put differently, the empiricism inherent in the reports constructs the scientists' beliefs. There is, therefore, a Humean understanding of cause and effect around climate change, adapting to it, mitigating it and putting specific policies or policy recommendations in place to advance climate change adaptation and mitigation. The convictions highlight why the specific policy recommendations, through the theory of adaptive management, is absolutely necessary. So, climate change is unpleasant because humans are not absolutely certain about its impacts on society and the natural environment. This uncertainty links directly to the human condition, in that the constant improvement of the human condition might be in jeopardy. It is also uncertainty, as already indicated, that makes it unpleasant because of its geographical spread and the different (perceived) impacts on various regions across the world and within countries.

Be that as it may, adaptive management shows a striking resemblance with the steps contained in the theory of the public policy process and its positivism. The public policy process involves problem identification, agenda setting, and design of the policy (policy formulation), policy adoption, decision-making, policy implementation, project management, assessment and dynamics. Training is also an important element of the public policy process (Cloete et al. 2006; Funke 2014). Information gathering and analyses are important functions in the public policy process for it is these processes that indicate the advantages and disadvantages of the choices outlined in the public policy process (Howlett and Wellstead 2011; Lundin and Öberg 2013). What is also important to note from a public policy perspective, is that it is made in a complex socio-political landscape where various actors interact with one another to make and implement policy (Cloete and Meyer 2006; Funke et al. 2011).

The public policy process is depicted in a structuralist manner with a linear flow of processes from problem identification to the consideration of alternatives. Structuralism is also a central characteristic of adaptive management. This structuralism is embodied in the ordered and linear way in which it should be implemented. Positivism also plays a central role in the adaptive management cycle, especially with respect to the setting of priorities, assessment and gauging of risk exposure and vulnerabilities, monitoring and evaluation and the implementation of

change management. Democratic principles, such as stakeholder engagement and communication, are another characteristic of adaptive management, also something embodied in the public policy process. In both adaptive management and the public policy process, these communication and engagement are assumed to lead to more effective policy formulation and implementation, as opposed to a command and control way of policy development techniques (Rogers et al. 2000; Roux et al. 2009). Ironically, adaptive management, as it is propagated in the two climate adaptation plans, puts command and control in the hands of the scientists that direct public officials on how exactly adaptation plans need to be implemented. This is more the case with the South African report that the Australian report. In the latter, the scientists followed a more participatory approach in researching the issue. Nevertheless, it is my opinion that because of climate change science's inherent uncertainty that adaptive management has found appeal as an approach to develop and manage adaptation plans.

To reiterate, it is not wrong to describe things or to solve problems using one theory. Yet, there is a price to pay. Adaptive management is very much in vogue as a way to plan for, and implement practices, to make communities, governments and companies more resilient. Yet, rarely do one-size-fits-all solutions deliver on their promises. This can have a debilitating impact on practitioners as they get demoralised (e.g. Miller et al. 2004) when implementing the principles of the theory and see that change is happening slowly or not at all. It can also have an impact on scientists in the long run. As practitioners see that the recommendations put forward by scientists have minimal or no effect at all, they could start losing faith in scientists' ability to deliver sound recommendations for the problems facing the human condition. This can erode the legitimacy of science, scientists and their methods to generate knowledge, and ultimately erode the legitimacy of knowledge itself. As mentioned earlier, PULSE^3's repertoire of theories can aid in avoiding a mono-theoretical explanation of, and solutions to the problem, by highlighting the factors not mentioned by adaptive management. It is possible that climate change, and its impact on local and provincial governments, can be made more understandable through a variety of theories or a combination of theories. This is particularly the case for climate change with its variety of sources and global impacts, which gives it an inherent complex character.

Questioning the applicability of one dominant theory will bring to light alternative theories with which to highlight issues. Problematisation will highlight other factors that are at play within the issue's realm. This is not to say that adaptive management should be discarded entirely. Yet, a questioning attitude could force one to consider alternative views of reality and by implication theories explaining reality. A critical solidarity attitude is therefore needed in this regard.

Here it is necessary look at those theories that seem likely candidates that are a close fit for explaining the issue, the opportunities and problems it could possibly create as well as the stakeholders involved. A glance at PULSE^3's repertoire of theories component, indicates theories that could be of potential value to government officials: the theory of social learning and policy paradigms stands out. I will briefly outline some of the assumptions contained in the theory.

The theory of social learning and policy paradigms has the following assumptions.

a. Important factors influencing policy at a specific period are past policy and associated practices.
b. Previous policy influences learning for new policies.
c. Past policy is more influential on present policy than social and economic conditions.
d. Practitioners' interests and ideals are shaped by policy legacies or the meaningful reactions to preceding policies (Sacks 1980; Hall 1993).
e. Experts in a certain field push for policy change.
f. These experts either work for the state or government departments or give government advice.
g. The advice comes from a privileged position situated at the intersection between the bureaucratic apparatus and epistemic communities.
h. Politicians do not play the most important role in social learning, but the officials or experts specialising in the particular field (Hall 1993).
i. The state act autonomously from social pressures with various stakeholders not playing a primary role in the policy process.
j. Learning happens when people gather new information, which is then applied to their succeeding actions.
k. Social learning is a deliberate attempt to adjust the goals or techniques of policies in response to past experience and new information.
l. Learning takes different forms (Hall 1993).

The theory of social learning and policy paradigms has a specific take on paradigms and their role in the policy process.

1. Paradigms are not fully commensurable and measurable in a scientific sense.
2. Paradigms contain their own account of the world practitioners operates in.
3. The views of experts are controversial because the process of paradigm replacement is more sociological than scientific.
4. Authoritative issues are central to policy paradigm processes.
5. Politicians face conflicting expert opinions from different paradigms.
6. Because of this, politicians will decide whom to regard as authoritative, especially regarding issues of technical complexity (Hall 1993).

The theory of social learning and policy paradigms shows a resemblance with adaptive management. However, the social learning and policy paradigms theory differs from adaptive management when it indicates the important roles policy paradigms play in the policy formulation process. Of importance, is the emphasis the social learning and policy paradigms theory place on the assumption that politicians can be subjected to expert opinions contained in different research paradigms.

2.2.6 Discussion

It is now possible to integrate adaptive management with the elements of the social learning and policy paradigms theory. Adaptive management is a new version of the original theory of policy formulation and implementation as outlined by Harold Laswell. Lasswell made his contribution to the policy sciences in the 1950s and into the 1970s. His work on the policy sciences is characterised by 'analytic differentiation' and the development of 'frameworks to ensure logical comprehensiveness' (Ascher and Hirschfelder-Ascher 2004: 23). For Laswell, political psychology played an important role in the policy process. People follow their interests together with others. When enough people are willing to invest in others' interests, an adequate degree of cooperation can emerge to achieve individual objectives 'through efforts to identify and secure the common interest' (Ascher and Hirschfelder-Ascher 2004: 26). The collaborative efforts between people are one of the main tenets of adaptive management. Collaboration is enshrined in the concepts of 'co-learning' and 'stakeholder engagement'. What is more, Laswell also developed one of the most influential conceptualisations of the policy process. He defined a number of functional activities in the decision making process: intelligence, recommendation, prescription, invocation, application, appraisal and termination. This process is functional because each stage represents an activity needed by a system to move on to the next phase. Lasswell's process is also cumulative since each series of activities produce results 'that are fed back into the process' (Nakamura 1986: 142). According to Nakamura (1986), various researchers used the ideas of Lasswell to develop their own conceptualisation of the policy process. In 1969, for instance, Polsby, acknowledging Lasswell's contribution, defined the process as policy initiation, incubation, modification, adoption, implementation and appraisal. Furthermore, and according to McLain and Lee (1996: 438), 'the approach [of adaptive management] borrows heavily from adaptive control process theory, which addresses the question of how to construct decision-making devices, capable of learning from experience.' What is more, adaptive management also relies to a great extent on operations research and management science. Operations research and management science use the scientific method and mathematical models to assist decision makers to make choices when faced with a complex environment (McLain and Lee 1996).

These arguments show that adaptive management is founded on previous theories of the policy process, its associated practices, the management of organisations, operations and the scientific method (a paradigm). What is different with adaptive management is that it brings into play the concepts 'resilience' and 'sustainable development.' These two concepts are important from an ecological perspective, since adaptive management's roots lie in ecology (Holling 1978). Why this overlap? It is possible that when adaptive management was first developed, it might have been a derivative of Laswell's policy science framework. The developers of adaptive management might have seen that the environment was omitted from the original Laswell theory and decided to incorporate factors, elements,

concepts and causal mechanisms that are directly related to ecology. This is how resilience, and later sustainable development, may have found their way into adaptive management theory. Because of ecology's positivist inclinations, the direct cause and effect relationship between the policy process and resultant resilience and sustainable development, was quite appealing and became the foundation of conversations between ecologists and practitioners. In other words, whereas Laswell's theory of the policy process focusses exclusively on public administration as a context, adaptive management focusses predominantly on the ecological domain. The settings, therefore, differ, but the paradigm and processes described remained the same.

From a theory of social learning policy paradigms perspective, adaptive management rests on past policies and associated practices found in government departments and other state and non-state entities: the linear and circular policy process. Put in another way, the theory of social learning and policy paradigms tells us that ecologists probably learned from Laswell's policy processes, adapted it and developed adaptive management. Because adaptive management has such a strong resemblance with the policy process, it can be argued that it responded more to the past policy than prevailing social and economic circumstances; the same process of developing adaptive management was used in a different situation.

From the two climate adaption reports analysed earlier, we also see that the actors pushing for the adaptation of adaptive management are natural scientists and a political scientist (Methner). They also work in an advisory capacity. The form of the advice they give is not the same in both reports. In the South African case, the advice is more in line with directives than advice as 'an opinion or a suggestion about what somebody should do in a particular situation' (OALD 2013). It is here where the South African report is more sociological or political than scientific. This sociological/political disposition is also discernible in the Australian report where certainty of the impacts of climate change is presented as given. In other words, it would appear as if the scientists did not ask what is in the practioner's interest. They assumed that what they are doing is in the practitioner's interest. There is therefore a political tone inherent in both reports. This is not to say that the reports are unscientific. Anything but! Yet, it is as if the positivist paradigm becomes a conduit for the power relations emanating from the scientists' thinking, which infuses the discourse within the reports. There is therefore no recommendation from one policy paradigm to another in the reports. It is rather a case of implementing the same policy process infused with different factors, elements, concepts and causative explanations. It is, therefore, a matter of supplanting one theory (the policy process) with another almost identical theory (adaptive management). This could be one of the explanations why there are mixed results when it comes to the implementation of adaptive management in different contexts (e.g. McLain and Lee 1996; Stankey et al. 2005). Scientists researching adaptive management's theory and practice in various contexts recognise some of its elements that are borrowed from the public policy process, warts and all. I am of the view that practitioners, when presented with 'advice' on how to implement adaptive management, recognise some of the elements of the public policy process and think: 'We are already implementing

some of these elements, all that is needed to shift the focus away from policy *per sé* and bring in climate change and other environmental aspects.' In my opinion, it is therefore not a matter of adaptive management's failure, but rather the differences in the scientists' and practitioners' perspectives that are, in turn, influenced by the contexts in which both parties work. The theory of social learning and policy paradigms teaches us that practitioners' interests and ideals are shaped by past policy legacies or the outcomes of previous policies (Sacks 1980; Hall 1993).

In the context of using positivism to sway the practitioner, do the experts play a more important role in social learning than the practitioner (Hall 1993)? To a certain extent, yes, but not in a dominant way because the implementation of government policy is not a straight forward and rational process based on strict cost-benefit analyses. In my experience as a former public official, there are a myriad of other factors at play, such as the standing of the practitioner in the organisation, her or his key performance areas that determine to what extent she or he advances up or down the organisation's career ladder as well as monthly income and the practitioner's health and family responsibility. The latter can play an important role in the amount of time the practitioner has at her or his disposal to implement policy. Management and leadership styles are just as significant, but not the only dependent variables. In other words, contextual and personal variables also play their part, not to mention previous experience and education in managing the issue. The social learning of practitioners through experts can happen directly or there can be a time lag between the presentation of the expert's ideas and the practitioner taking notice. Then there is also the way in which the expert presents his or her ideas. If the practitioner is not interested in the manner in which it is presented, and fells unimpressed, the idea is unlikely to have the desired effect. So, learning can happen or it cannot, depending on specific personal and contextual circumstances. This means that social learning is a deliberate attempt to adjust the goals or techniques of policies in response to past experience and new information (Hall 1993), should the practitioner choose to take the new information into account. Having explained all these factors, it is quite possible that the state can act autonomously from social pressures with various stakeholders not playing a primary role in the policy process (Hall 1993), including experts.

Why would a practitioner reject adaptive management rather than adopt it as a practice? Because authority issues are central to the policy paradigm change process, it is significant to note that a practitioner in a government department might be a climate pessimist, something adaptive management finds difficult to explain. Paradigms, as worldviews, also play their part. Not every practioner believes that climate change is human induced. Also, not every practitioner believes that there is such a thing as climate change. The climate pessimist could be the reason for the positivist way of depicting adaptive management processes because researchers might be convinced that science, and the scientific method, could carry the necessary weight that will sway the climate pessimist. Such a climate pessimist might use her or his leadership role as a lever to diminish the influence of the scientist, the knowledge they generate as well as the types of agency they recommend. The psychological elements: emotions, believes and convictions of scientists and

practitioners can be key causal factors in the success or failure in the uptake of adaptation strategies and their science. Dragging feet on the implementation of adaptation plans are plausible in this context. What if the practitioner is a climate optimist rather than a pessimist? In this case, the adaptation report is likely, but no surety, to be taken seriously during formulations to deal with climate change. Said differently, it could be a positive factor in the uptake of science in the policy process. It could also come at a price for the scientists in that their contribution might not be explicitly recognised. This could hold implications for the service science performs to practitioners and citizens—the ivory tower might become an attractive recluse for the scientists should recognition not be forthcoming. These are hypothetical situations created with some of the factors contained in the ambiguity theory of leadership. The point I try to make with these hypotheses, is to indicate that adaptive management, as a theory of practice, is unlikely to highlight why adaptation strategies could succeed or fail. Emotions and passions, as well as the complex dynamic of everyday bureaucratic and public administration environments, could play a far more causal role than the prescribed processes to bring about resilience and sustainable development.

Theories, other than adaptive management and the theory of social learning and policy paradigms are also applicable to the issue of climate change its varying impacts on society and how to address it as a global governance issue. A few of these theories that comes to mind are: (1) interactive governance theory assuming that governance, often not harmonious, depends on the interaction of a variety of actors and their interactions (Kooiman and Bavinck 2013); (2) modernity theory noting that the era of modernity arose due to the advent of the industrial revolution (Adams 1993) (with the accompanied burning of large volumes of fossil fuels) described by Giddens (1990) as a juggernaut or a runaway engine that has enormous power that humans cannot control, to some extent, but something that can also get out of hand; and (3) the theory of risk society giving credence that modernity has created a number of risks or large negative impacts on environmental and social systems (Ritzer 2000; Björkman 1987), climate change included.

The link between these theories and climate change is recognisable. Climate change, a result of the burning of fossil fuels that has reached unprecedented levels since the industrial revolution, created risks not only for the environment but also for society at all levels and scales. The amelioration of these risks could come from the interaction among a variety of actors in an interconnected and often non-harmonious fashion. Because of this, and since climate change is a global phenomenon, this issue will remain at top of the international agenda for some time to come. Addressing the problem of climate change will not only find credence within the natural sciences because of this type of science's centrality to the investigation of the phenomenon. Social science, and social scientific theory, for that matter, also have a role to play. After all, the problem emanates from society, and what better way to look into the social sources of, and societal vulnerabilities to global and regional climate change, than through a social scientific lens. The other theories mentioned here indicate other causal narratives that explain not only why climate change is a reality, but also how humans could go about ameliorating

climate change impacts. The burning of fossil fuels has reached unprecedented levels in modern human history, particularly in the northern hemisphere. This has created risks for all countries, and not just for those burning the most. In this regard, ethical considerations as to who should take responsibility or at least cut back on emissions become clear. Here, I would like to end by asking if adaptive management contain sufficient causal narratives to indicate who should take responsibility. In my view, I think adaptive management is very silent on climate change's ethical dimensions, because it side-lines the human element of which ethics is a major part. And since adaptive management is a problem solving and structuralist theory, it places the responsibility of amelioration on government structures and the development of policies, programmes and plans along positivist prerequisites. Adaptive management does not give an indication of the role of the private individual or citizen, which is, in my view, just as important a role player in society than government officials and the political elite.

Would it not have been better to conduct the studies by involving public administration experts and officials from the start? I noted that local government is supposed to be the closest to the people. In many South African rural municipalities, I have experienced that citizens are more concerned about the supply of basic services like water and sanitation, refuse removal and electricity distribution (Meissner 2015), than with matters relating to climate change. If these services are in short supply, why would one, in the first place bother with climate change, and secondly ask natural scientists to conduct such a study without the input from public officials. It is after all, public administration processes that hamper service delivery; and the discipline of Public Administration would also need to be part of climate change research endeavours.

2.3 South Africa's National Water Resource Strategy, Second Edition

2.3.1 Introduction

I argue that research paradigms and theories are the foundations of water governance structures because they constitute the development of governance along dominant thinking within a discourse. This argument has implications for the practical application of views and concepts in water resource governance. Change in society does not occur automatically; it is usually caused by an event or someone. The latter operates from a certain cognitive outlook and with an intention in mind. Individuals play an important role in complex governance processes with feedbacks into policy processes (Meissner and Jacobs 2016). Individuals can be private citizens, public officials and private sector practitioners, arguing from a certain approach to ameliorate a problem. Approaches can be as holistic as possible, but if they do not rely on an eclectic foundation with multiple research paradigms and

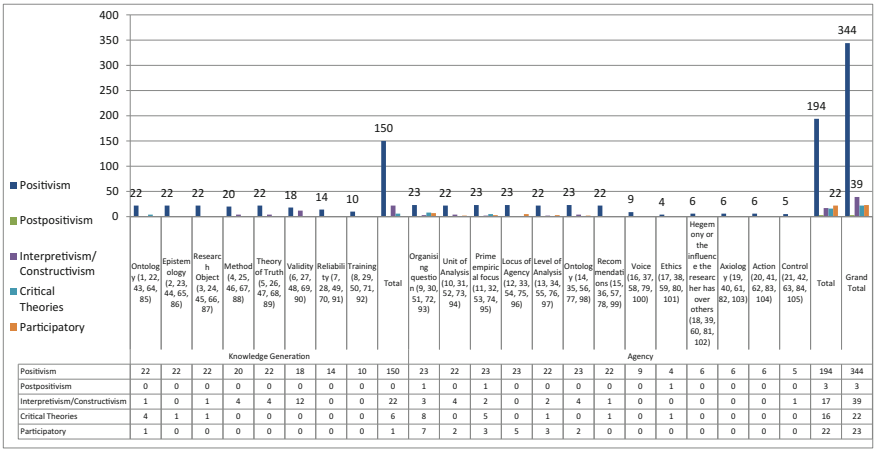
theories, they are unlikely to provide the necessary understanding for practitioners. Complex challenges demand the integration of diverse expertise and ingenuity (Meissner and Jacobs 2014). This diversity includes a variety of research paradigms and theories. I will analyse the South African Department of Water and Sanitation's (DWS) National Water Resource Strategy, second edition (NWRS2) (DWA 2013), to understand which research paradigm(s) and theory or theories influenced its development. I will analyse the Strategy using the PULSE^3 framework for analysis before ending with a discussion and conclusion.

2.3.2 Paradigm Assessment of the NWRS2

In this section, I present the NWRS2's paradigm assessment. It consists of two parts; the first discussing the meta-theoretical assumptions around knowledge generation and the second the assumptions on agency. Throughout the discussion, I will use examples from the Strategy to illustrate the points made.

2.3.2.1 Knowledge Generation

The paradigm assessment indicates that the NWRS2 is underpinned by positivism (see Fig. 2.3). The meta-theoretical assumptions that scored the highest are ontology, epistemology, research object and theory of truth. These four assumptions all received a score of 22 each. They were followed by method (20), validity (18), reliability (14) and training (10). The total score for the second highest paradigm (interpretivism/constructivism) was



Positivism	22	22	22	20	22	18	14	10	150	23	22	23	23	22	23	22	9	4	6	6	6	5	194	344
Postpositivism	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	3	3
Interpretivism/Constructivism	1	0	1	4	4	12	0	0	22	3	4	2	0	2	4	1	0	0	0	0	0	1	17	39
Critical Theories	4	1	1	0	0	0	0	0	6	8	0	5	0	1	0	1	0	1	0	0	0	0	16	22
Participatory	1	0	0	0	0	0	0	0	1	7	2	3	5	3	2	0	0	0	0	0	0	0	22	23

Fig. 2.3 Paradigm assessment score of the National Water Resource Strategy, second edition (Meissner 2016a)

22. For interpretivism/constructivism, validity was the meta-theoretical assumption with the highest score (12), followed by method and theory of truth with a score of four each. Critical theory's total score was only six. The breakdown of its score was four for ontology and one for epistemology and research object each. The participatory paradigm's total score was one for ontology only (Meissner 2016a).

Two explanations could shed light on the high score the four positivist meta-theoretical assumptions received. The first inference relates to the nature of the resource the Strategy deals with. The second conclusion, and related to the first, is the type of science that deals with planning around water.

Water is a chemical compound that is necessary for the production of goods and services in all spheres of the economy. Water is also considered to have 'great power' for humans; it is a 'magical force' in that its shapes, renews and nourishes earth and life on it. It is seen as the planet's life blood (Gillings 2010). The importance of water for the economy, and as a life sustaining substance, is exemplified in the vision, goal, principles and objectives of the NWRS2. The vision is 'Sustainable, equitable and secure water for a better life and environment for all.' The goal to achieve this vision is: 'Water is efficiently and effectively managed for equitable and sustainable growth and development.' The centrality of water as a resource that sustains life and the economy is further set out in the Strategy's objectives. According to the NWRS2, the three goals support the country's social and economic goals and the sustainable management of water resources. Firstly, water is essential for development and the eradication of poverty and inequality. Water also needs to contribute to the economy and job creation and, lastly, water has to be protected, developed, used, conserved, controlled and managed in an equitable and sustainable manner (DWA 2013: 12). The central message in all this is the betterment of the quality of citizens' lives. For South Africa's citizens to exist, the water resources of the country need to be managed in a particular manner. The economy and job creation take centre stage making the Strategy anthropocentric instead of ecocentric. What is also noteworthy, is the way in which water is used for the advancement of the country's citizens. South Africa will not only manage its water resources, it will manage it in a sustainable manner, and it will control the water resources inside its territory (DWA 2013). This is not to say that the environment is kicked out, so to speak (Meissner 2016a).

Sustainable development resonates strongly throughout the Strategy. The philosophical foundations of sustainable development were laid in 1987 by the World Commission on Environment and Development (the Brundtland Commission). According to the Brundtland report, humanity has the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs (UN 1987). According to Beder (2001), governments incorporate economic positivism into sustainable development. Beder (2001) further contends that sustainable development prioritises the importance of equity within and between generations, while economic positivism highlights economic efficiency. Equity and efficiency are combined in the NWRS2 in this manner. It is therefore not sustainable development that is positivist. It is its incorporation into economic positivism that gives sustainable development a

positivist flavour in that the practice of sustainable development will bring about the better management of South Africa's water resources.

What I have said so far indicates that the Strategy relies on the positivistic approach to planning. In positivism 'science and technology are combined to establish a model with clearly defined goals…objectives with measurable achievement of goals, the collection of information on possible alternatives as well as associated costs and benefits and a selection of alternatives or set of alternatives that bring about "maximal achievement of public goals at minimal costs"' (Berke 2002: 23 cited in Depalma 2009). In the Strategy's preface, the former Minister, Edna Molewa, states that: 'If we are serious about achieving equity and redistribution and the goals of our developmental state, we need to streamline our policies, legislation and strategies for both water resource management and water services' (DWA 2013: i). The main goal of the Strategy is that: 'Water is efficiently and effectively managed for equitable and sustainable growth and development' (DWA 2013: v). These growth and development goals are in line with the National Development Plan (NDP) noting that: 'Current planning assumes that it will be possible to achieve an average reduction in water demand of 15 % below business-as-usual levels in urban areas over the period leading to 2030' (NPC 2011). Water supply plays a central part in the Strategy. Yet, water will not only be supplied through the construction of dams and other water-related infrastructure. Water supply alternatives include desalination through a variety of technological means such as membrane-based, ion exchange-based and precipitation-based technologies. As for water re-use, annexure C outlines the National Desalination Strategy. Another alternative is the re-use of municipal wastewater for urban and industrial uses, treatment of acid mine drainage and the direct re-use of treated municipal wastewater for potable purposes, among others. To achieve this, a National Strategy for Water re-use is explained in annexure D. In both these water re-use strategies, cost and benefit play an important part in the rationale behind their implementation. The desalination strategy notes that: 'Desalination is already being implemented in South Africa and is cost-effective compared to the alternatives' (DWA 2013).

Also noteworthy is the utilisation of technical reports or scientific studies to substantiate arguments or generate ideas. These reports and studies are from the natural sciences and include some prominent names in water research. Peter Ashton conducted research on South Africa's freshwater resources (e.g. Ashton 2007), transboundary rivers (e.g. Kistin and Ashton 2008) and water quality issues (e.g. Ashton 2007). The NWRS2 also cites reports produced by Roland Schulze from the University of KwaZulu-Natal. Schulze is known for his work on climate change (e.g. Schulze 2011a; Stuart-Hill and Schulze 2010) and adaptive management (e.g. Schulze 2011b). Also noteworthy is the use of Nel et al.'s (2011) *Atlas of Freshwater Ecosystem Priority Areas in South Africa* (DWA 2013; Meissner 2016a).

The Strategy also relies on research published by the Water Research Commission (WRC). Not only does the Strategy reference the Commission's published research, the WRC is also mentioned as a strategic partner in the research and development of water resource issues. With respect to research and innovation, the Strategy notes that: 'More than half of water research activities, funded and

coordinated through the [WRC] are conducted by universities, science councils, organs of state, the private sector, water utilities and other agencies such as the [Council for Scientific and Industrial Research]. A number of water role players make significant and independent input, such as Eskom, Sasol, mining and agricultural companies. Hence, the consolidation of collective intelligence, enabling the development of a comprehensive inventory of all water-related research nationally, is of strategic priority' (DWA 2013: 94). Policy development is influenced by a variety of actors; scientists (Meissner et al. 2013) and technical personal from institutions like Sasol included. The analysis of the knowledge used is mainly from the natural sciences. This corroborates a conclusion on research conducted on South Africa's water resource institutions by Meissner et al. (2013); that most of the research comes from the natural sciences where positivism is the dominant research paradigm in generating knowledge.

The issue with the above-mentioned studies, is that the scientists that produced them are not interested in the philosophy of science. They will not consider questions like what do we mean by "truth", or what is progress in science or explain scientific products. It is quite possible that the philosophy or science was not part of their training or their main concern (Kratochwil 2007) when they conducted their research and drafted their reports. Regarding this, Kratochwil (2007: 34) asserts that: 'To that extent, the actual investigation of scientific practice, disclosed by detailed studies in the development of scientific thought in different fields, is always considerably at odds with the ideals of science and its account of progress. Apparently, warranted knowledge is generated in a way quite different from the positivist reconstructions that underlie our textbook histories of science.' He goes on to say that various sciences developed because they did not take the scientific method too seriously (Kratochwil 2007). For the scientists that produced the scientific studies, used to produce the NWRS2, scientific progress was possibly not the main concern. What was important for them was to show, through scientific evidence, the reality of the country's water resources and how to manage that reality.

2.3.2.2 Agency

Positivism also scored high under the agency component with a total score of 194. The meta-theoretical assumptions that scored the highest were organising question (23), unit of analysis (22), prime empirical focus (23), and locus of agency (23), level of analysis (22), ontology (23) and recommendations (22) (Fig. 2.3). A possible explanation for this is the nature of the agent that developed the Strategy: the government and more specifically the Department of Water and Sanitation that utilised knowledge generated by the positivist paradigm. From the strategy it is clear 'who governs and who benefits' (organising question); government governs and the rest of society benefits. This particular 'organising question' manifests in the following passage from the Strategy: 'This Strategy responds to priorities set by Government within the NDP and National Water Act imperatives that support sustainable development' (DWA 2013: iii). The NWRS2 places a lot of

attention on structures of rule, like the National Water Act (No. 36 of 1998) (RSA 1998), constitutional rights of 'access to sufficient water' and the Water Service Act (No. 108 of 1997) (RSA 1997) as well as the Southern African Development Community's (SADC) Revised Protocol on Shared Water Courses (DWA 2013). The ideational entrepreneurs mentioned above also give credence to this positivist unit of analysis. The prime empirical focus of the Strategy is on the supply of order and welfare maximisation (Hobson and Seabrooke 2007). Good governance is put forward to ensure that unsustainable water management does not lead to risks to employment, the environment, human health and political stability. One of the most important priorities in the Strategy is the management of water for the generation of electricity (DWA 2013), deemed a strategic economic priority by the majority of people in the country. The locus of agency is top-down (Hobson and Seabrooke 2007), and relates to the nature of the government department that produced the Strategy and 'who governs and who benefits' assumption. Regarding this, the DWA (2013: 1) states that the NWRS2 focuses particularly, 'but not exclusive …on the role of the State, specifically the Department of Water and [Sanitation] (as water sector leader)…'

Control of the water resources in South Africa invokes the hydraulic mission, or the mobilisation of more water through engineering (Reisner 1993). The hydraulic mission's rationale is to establish conditions where water supply facilitates socio-economic development and political stability (Turton and Meissner 2002). The hydraulic mission is a type of 'ideology' that becomes part of the 'sanctioned discourse' and 'leading to the creation of a dominant belief system…' (Turton 2000 cited Turton and Meissner 2002: 39). It is not only feats of engineering that plays a role in the hydraulic mission but also political considerations, and especially the interaction among different actors within the ambit of hydraulic engineering programmes (Meissner and Turton 2003). This interaction is the likely reason for the emphasis of an ideology within the hydraulic mission's discourse.

The promotion of the hydraulic mission is quite evident in the NWRS2, and although it emphasises that the country '…move beyond "traditional engineering solutions" of infrastructure development…' it calls for '…a multitude of strategies, including [WCWDM]…, further utilisation of groundwater, desalination, water re-use, rain water harvesting and treated acid mine drainage.' The WCWDM (water conservation and demand management) stance is prioritised and is likely to lead to the postponement of water engineering infrastructure, the mitigation of climate change, the supporting of economic growth and enough water for equitable allocation. The WCWDM approach rests on a positivist research paradigm underscoring activities like water resource management, distribution management, and consumer demand management and return flow management (DWA 2013). The NWRS2 utilises knowledge developed by Seago and McKenzie (2007) to indicate the benefits and practical interventions of WCWDM. The interventions include among others: water quality management, social awareness and education, water resource rehabilitation, dam storage optimisation, alien vegetation removal, pressure management and metering retro-fitting, effective pricing, polluter pays, regulations and so on (DWA 2013). These, except for social awareness and education,

fall within the positivist paradigm because social awareness and education are more likely to be implemented successfully through social scientific research rather than positivist heavy natural scientific disciplines.

2.3.3 *The NWRS2 Through the Lens of Analytic Eclecticism*

The positivism of the NWRS2 shows research paradigmatic limitation. That is not to say that we understand less about water resources in South Africa and the relationship between the resource and the functioning of society. The research conducted by water scientists over the years informing the knowledge and agency content of the Strategy, have generated useful insights. Their research has also provided pragmatic ideas on how to create opportunities and ameliorate problems. Even so, the prior assumptions about what type of knowledge is relevant (e.g. hydrological data, reconciliation of systems and the increase of supply) (DWA 2013), which actors are relevant (engineers and hydrologists) and the structures of rule, such as the National Water Act (No. 36 of 1998) (RSA 1998), are the foundations on which knowledge is generated and agency affected. The problem with this arrangement is that after a while the assumptions are considered law-like by researchers and practitioners. The assumptions are not questioned and they become the central canon of knowledge generation. Because the NWRS2 is built on the (rational) scientific method, reinforces its assertive character. The result is an increase in the sophistication of arguments that influencing recommendations that agents (e.g. government) have to implement. This is possibly the reason for the focus on technical solutions such as WCWDM, desalination and water re-use (DWA 2013).

Metatheoretical assumptions from other paradigms are, however, present within the NWRS2. When the Strategy discusses support to municipalities, it states that this will be done through: 'Mobilisation of partnerships and support from the private sector in respect of technical expertise, funding, training and implementation' (DWA 2013: 58). Elsewhere it states that: 'Education and awareness is not the function of national government only; and all sector institutions, private sector organisations and civil society should be institutionalising the promotion of [WCWDM]' (DWA 2013: 58). These two examples are indications of agency based on the participatory paradigm, to a certain extent, that supply order and welfare maximisation by political elites (Hobson and Seabrooke 2007; Meissner and Ramasar 2015), practitioners from different spheres of society and researchers. This means that there is not a paradigm shift from positivism to the participatory paradigm, but rather an evocation of participatory paradigm assumptions on how the technical aspects could be achieved. The NWRS2 is, from an international relations perspective, quite neorealist in nature. According to neorealism, state practices are 'calculating' and 'economically rational' (Ashley 1984: 233). Although ideational and agency elements are present in the NWRS2, they are toned down in favour of structuralist and

material elements. The emphasis on economic development and energy generation, as priorities, speak to the material domain, while the dominant and developmental state is in reference to the structural realm. Those agents and ideational aspects that are mentioned, such as science backing the various aspects of the NWRS2 and the scientists whose work had been referenced, are, as far as I am concerned, also structuralist and material. Ashley (1984: 235) notes that: structuralism '…aims to construct the objective relations… that structure practice and representations of practice, including primary knowledge of the familiar world.' He follows this by another argument when he says that: 'What concerns structuralists in general is not practice *per sé* but the logical conditions that account for the significance and signification of practice within a community.' Because the developers of the NWRS2 referenced natural science studies, indicates the signification of natural scientific practice in the South African water sector.

Should we discard the paradigmatic ways in which the NWRS2 is constructed? Not at all! What needs to happen is to investigate the relationship between alternative research paradigms and how these relate to the various issues raised throughout the Strategy. Alternative theories could assist in this matter. Before I get to these alternative theories, I would first like to discuss the theory I believe underpins the NWRS2: rational choice.

2.3.3.1 Rational Choice underpinning the Knowledge and Agency of the NWRS2

In this case study, I have already alluded to the influence of economic positivism and associated costs and benefits on the NWRS2. One of the basic principles of rational choice theory is the idea that all action is in their core 'rational'. The other part of this tenet is that humans are likely to calculate the possible costs and benefits of any action before making a decision. The theory recognises only purely and calculative actions and not actions based on, for example, emotional or habitual action. Rational choice theory has a close relationship with mathematics in economics (Scott 2000). As such, rational choice theory can be considered a grand problem solving theory with an affinity to mathematics and economics. Rational choice theory tells us how to achieve objectives either individually or collectively. It is in this regard, a 'theory of advice' (Ostrom 1991: 238). It is plausibly, because of this close relationship with mathematics and economics, that rational choice theory is featuring so strongly as a fundamental understanding of reality in the NWRS2.

Rational choice theory rests on a number of assumptions. One of these premises is that complex social phenomenon is explainable through basic or elementary individual actions on which occurrences are composed of. Examples of social phenomena include the formation of rules, institutions, norms as well as communities. The establishment of these aspects is called instrumental action and this action is based on individuals that act deliberately and in a self-conscious manner. In this deliberate way, individuals are in a position 'to define a hierarchically ordered set of preferences and who can make quasi-mathematical calculations to

determine the ideal strategies for realizing those preferences based on their estimates of other actors' behaviors in a given situation' (Sil 2000: 356–357). Individuals behave because of their wants and goals that express their preferences. People act within specific constraints and based on the information in their possession about the conditions under which they are acting. The theory also notes that humans have to anticipate the conclusion of alternative courses of action and calculate which one will work best. The alternative with the greatest benefit will be chosen (Scott 2000). Actors will choose the most efficient means to achieve objectives. Rational choice theory is, in many of its guises, concerned with the provision of public goods (Heywood 1999), such as water. When it deals with public goods it is called public choice theory. The benefit of the goods cannot be withheld from individuals who choose not to contribute to the provision of such resources (Heywood 1999).

People act rationally at both the micro and macro levels (Goode 1997). If we assume that people are rational or act in a conforming manner to the theory's predictions, we can then develop the best strategies actors could adopt in situations with specific structures (Ostrom 1991). What are some of these predictions? When there are an infinite number of social dilemmas, rational choice predicts a large number of 'equilibria.' These 'equilibria' will range from the very best to the very worst available outcomes without a 'hypothesized process for how individuals might achieve more productive outcomes and avert disasters' (Ostrom 1998: 2). Said differently, a hypothesised process, like a research project that starts with *a priori* assumptions, will not be necessary to indicate how individuals might go about developing policies to address problems through recommendations based on *a priori* assumptions.

Another assumption of rational choice theory is that the social environment, surrounding the individual, influences the strategic choices of actors. Even so, the social environment does not shape the identity or interests of the actor. Instead, the actor uses his or her or, in the case of organisations, their cognitive ability to identify the correct way of achieving actions. This identification of the correct way is based on cost-benefit calculations (Coicaud 2014). The structure in the case of the collective organisation could be the organisational hierarchy that either promote or inhibit innovation or that encourages the use of specific theories to inform policy. This structure encourages decision-making that views 'the cognitive process of deliberation and decision as void of emotions…' (Coicaud 2014: 500). In this case, the theory of rational choice notes that psychology explains only deviations from rational behaviour (Mercer 2005). Emotions cause people to lose track of the 'how to act rationally' and also 'how to capitalise on the outcomes of their rational behaviour'. Said differently, emotions make individuals to act less rationally than what the hierarchical structure stipulates. Individuals are also unable to calculate costs and benefits less efficiently when they are influenced by emotions.

What this last statement about cost-benefit calculation and emotions' influence says, is that rational choice theory explains how actors should reason, and not how an actor actually reasons. If an actor follows the theory closely, the more rational its judgement would be. The less it follows the model, the less rational decisions, are

and the more likely the result of undesired outcomes (Mercer 2005). Said differently, and on an ontological level, rational actors exist prior to external social contexts (Wallin 2014). What this means is that rational choice theory is the 'paradigmatic positivist tool of analysis' (Smith 2007: 394) underpinning the strategic choices contained in the NWRS2 (Table 2.2).

Having discussed rational choice theory's basic assumptions, how does the theory, contained in the NWRS2, understand the problem the NWRS2 is attempting to ameliorate? Based on the analysis done so far, I am of the opinion that the rational choice theory would not consider South Africa's water problems as messy. The reason for making this argument is that the volume of water in the country's territory is the foundation on which rational calculations could be made. Where social aspects like gender, equity and equality play a role, the prescriptions from international norms and standards give guidance (see the UNDP case for more information on these norms and standards). In other words, calculations can be made without the complexity that social aspects bring to the table. Predictions are, therefore, available based on a large number of equilibria without hypothesising how gender, equity and/or equality will affect the possible outcome of the prediction. Having said that, and because the inherent emotional or psychological elements of these social phenomena are ignored, the strategy can be based on the rational choices to increase the country's water resources through desalination technologies and WCWDM. The only unpleasantness to the problem would be, in my opinion, to change policies, plans and programmes to arrive at the vision contained in the strategy. This means that the necessary change in structures will be sufficient to bring about the desired change envisioned in the NWRS2. The cause-effect relationship is therefore Humean with a change in policies, plans and programmes producing the desired outcomes to increase South Africa's water resources. With this linear cause and effect relationship, based on rational choice theory, in mind, we can ask why base the NWRS2 on rational choice theory rather than any other theories that could explain how the NWRS2 might be implemented in the most efficient manner without forgetting certain societal dynamics at play in the water sector? To shed light on this question, I will enrich the understanding of these dynamics with two theories: agential power and the ambiguity theory of leadership.

2.3.4 Theories for Practice

The NWRS2 constitutes a specific understanding of the country's water resources and how to manage or 'control' the resources. The Strategy reduces the country's water resources to the processes as outlined by the water cycle in annexure B (DWA 2013). This reductionist notion is then elaborated upon to show that it is possible to manage water in a reductionist manner—control through the use of technological solutions with education and awareness raising being part of the equation. This reductionism is influenced by positivism and vice versa. In addition,

Table 2.2 Rational choice theory's ontological and epistemological structures

	Concepts	Actors	Independent variable	Interceding variables	Dependent variable	Causal mechanism
	Rational action Deliberate action Goods or resources Social dilemmas Equilibria Predictions Social environment (including structures) Deviation Emotionless action Tool of analysis	Calculating individuals Calculating (public and private) collectivities staffed by calculating individuals that work together in an innovative manner to develop strategies	Individuals and collectivities Social dilemmas Collective action	Instrumental action Information in the hand of actors Rational choice Social environment Cognitive abilities	Social phenomena Equilibria Strategic choices Correct choice of actions Disaster aversion	Instrumental action Calculation Anticipation Provision of resources Large number of social dilemmas Cognitive abilities enabling individuals and collectivities to think about the best way to ameliorate problems and create opportunities Social environment including structures influence strategic choices but not interests and identities
Connections	Deliberate cognitive-based actions influence individual and collective actors to make rational choices in the development of strategies, which contain calculated cost-benefit analysis that will ultimately influence decisions.					
Complementarities	Rationality leads to innovation that enables actors to devise actions based on cost-benefit analyses and efficient outcomes.					

the Strategy is also influenced by one type of ideational entrepreneur; the positivist (natural) scientist. I bracket the 'natural' because natural scientists dominate the water research landscape (Meissner et al. 2013) and social scientists can also argue from a positivist research paradigm. The NWRS2 also portrays the state as '… standing over or apart from society and transcending all social actors' (Hobson 1997: 228). How can we widen our understanding of the NWRS2 and its implementation?

Although the NWRS2 highlights participation of the private sector, the overall impression is that of a Strategy directed by government. Two theories that can bring about a deeper understanding of the situation are agential power (Hobson 2000; Meissner 2004a; Hobson and Seabrooke 2007; Meissner 2014) and the ambiguity theory of leadership (Alvesson and Spicer 2011). Both theories look at societal processes and actors from an interpretivist/constructivist and participatory paradigm perspective.

2.3.4.1 Agential Power

Agential power gives actors agency to influence their environment and each other (Hobson and Seabrooke 2007). Agential power falls into three categories: domestic, international and reflexive agential power. I will only discuss reflexive agential power because it deals with the relationship between societal actors. Reflexive agential power refers to the 'ability of the state to embed itself in a broad array of social forces…' including class and normative structures. This increases the state's governing capacity since it is less isolated from society and other actors external to its immediate governing domain. If an actor succeeds in widening its network of collaboration it increases its power (Hobson 2000, 1997; Meissner 2004a). When an actor is embedded within social structures it is bounded within society. State and society cannot be separated (Hobson 1997: 236). If a state does not routinely negotiate with groups in society it has despotic power and low capacity to govern (Hobson 1997, 2000). Hobson (1997: 238) notes that '…strength can be achieved only through *effective* politics; and this ultimately requires a strong dose of cooperation as opposed to abrasion with society.' Depoliticisation is not an option where there is a seemingly lack of state capacity, but an increase in the effectiveness of the allocation of values in society (Easton 1985) as well as with and through society. To consistently resist civil pressures, in light of state capacity, is a sign of weakness, not strength. This brings to the fore the notion of competitive-cooperation in which two actors get along with each other because their conflict is not zero-sum, but collectively beneficial (Huntington 1991 in Hobson 1997).

2.3.4.2 Ambiguity Theory of Leadership

The ambiguity theory of leadership states that versions of leadership are invented or constructed by people. This construction takes place when they draw on their

assumptions, expectations, selective perceptions, sense-making and imaginations of leadership (Alvesson and Spicer 2011). Leadership exists only as a perception and not a viable scientific construction (Calder 1977: 202 cited in Alvesson and Spicer 2011) that scientists can measure and predict. Because of leadership's constructivist, the theory notes that leadership varies from person to person and context to context. Leadership is often incoherent and complex. Because of the concept's different meanings, it is difficult to say exactly what leadership is. Leadership is a construct that is an ambiguous and contradictory phenomenon. The different meanings and constructs bring out the potential for ambiguous interpretations, understandings and leadership experiences. Ambiguity and fragmentation is at the centre of the leadership process. Leadership itself is highly ambiguous and is a blurred concept, like goodness, that could almost mean anything and everything. As such, people use the concept to reach certain desirable goals. These objectives could include: attributing responsibility to senior managers for numerous outcomes, booting the identity of managers and creating faith that leadership is a panacea or cure-all in almost every undesirable situation. The utility of the concept serves as a lever to create certain things, especially making us belief that leadership can do wonders, which is not the case, according to Alvesson and Spicer (2011). Leadership's attributed meanings are pivotal sources of ambiguity. The sources of ambiguous meaning of leadership are leaders, their followers and the context in which leaders and followers act. Leaders are not always sure about what it means to do leadership, and what they are doing is actually leadership. Followers interpret different acts as leadership. The context promotes different understandings and ideas of the meaning of leading (Alvesson and Spicer 2011).

2.3.5 Discussion

Based on the theory of agential power and the ambiguity theory of leadership, how can the NWRS2's successful implementation be enhanced? To shed light on this question, it is necessary to start with the manner in which the NWRS2 had been formulated. I have already showed that the natural sciences and their rational scientific method dominate the NWRS2's knowledge base and agency. How the Strategy was developed and how it will be executed goes hand-in-glove. It is here where agential power starts to shed light on an alternative understanding of NWRS2 and its execution.

That the NWRS2 relies on scientific studies by a number of prominent scientists gives the Strategy credence based on the standing of the scientists. This is also the case where the NWRS2 invoke integrated water resources management in combination with the notion of developmental state. Other 'scientific' concepts like 'virtual water' (DWA 2013), or the volume of water needed to produce import and export goods and foodstuffs, (Allen 2001; Meissner 2003; DWA 2013), also give credence to the NWRS2 positivist underpinnings. It is therefore not entirely impossible that the NWRS2 is a reaction to current trends in the global water

governance discourse. This is evident where integrated water resources management is combined with the developmental state. The developmental state plays a central role in managing water resources that, in turn, play a critical role in equitable social and economic development (Van Koppen and Schreiner 2014). It is as if the authors of the NWRS2 were including integrated water resources management as a management practice to align it with global practices, despite the criticism levelled against integrated water resources management (e.g. Merrey 2008; Claassen 2013; Van Koppen and Schreiner 2014). It is therefore not only prominent scientists that have power, the concepts they develop can also influence policy. This influence does not only come from within the South African water sector but also the international water governance domain. The case of developmental water management (e.g. Van Koppen and Schreiner 2014), integrated water resources management and virtual water are prime examples of concepts that reside within the international water discourse.

Since agential power gives actors the ability to influence their environment and each other (Hobson 1997, 2000), the NWRS2 indicates a measure of agential power. This is due to the structuralist and material arguments on which the Strategy's knowledge generation and agency is based. Through the NWRS2, however, the DWS embeds itself into a certain structural and material domain; positivism and the knowledge produced by natural scientists. The NWRS2 is bounded to these structures and cannot be separated from them and other material aspects (e.g. cost benefit analysis). The NWRS2 exhibits high despotic power (Hobson 1997, 2000), that could potentially influence government's governing capacity to implement the Strategy. It can be said that the NWRS2, and by extension the DWS, has no or low reflexive agential power (Hobson 2000; Meissner 2004a). How can DWS enhance its reflexive agential power? According to the theory, an actor can influence its governing capacity positively if it widens its network of collaboration (Hobson 2000). When drafting the NRWS2, DWS received a number of written submissions from non-state actors (e.g. non-governmental organisations [NGOs], interest groups, businesses and individuals) (DWA 2013). At first glance this would appear like high reflexive agential power. It is arguably not, because not all South African citizens, NGOs and interest groups submitted submissions. Also, not all individuals are literate and were therefore able to submit submissions. It can be argued that only certain classes in society submitted submissions (i.e. the capitalist and middle classes). The list of written submissions also indicates that it was organised entities that dominated, with only a handful of individuals participating. This also indicates structuralist and material elements dominating the NWRS2. That written submission had been received shows that the DWS invited written submissions and that government is at the top of a hierarchy when consulting other non-state actors. It is therefore a case of the DWS governing and other societal actors benefiting or reacting to requests for submissions.

The ontology of the South African water sector is a bit more complicated that the structuralism and materialism influencing the NWRS2's knowledge and agency. Although equity and the environment are mentioned as priorities (DWA 2013), the

ontological complexity of these issues is downplayed. It is good that the water cycle is mentioned to bring about an advanced understanding of the country's water resources. The NWRS2 sketches a very objective reality that is separated from individuals. It becomes more complicated when people see themselves participating, in one way or another, in the water cycle. For instance, an engineer working at a power utility like Eskom has a certain view of where the utility's power stations are located in the water cycle and how it influences the cycle through the use of large volumes of water for power generation and cooling (e.g. thermodynamics). An individual from a rural community that is reliant on a river for drinking water, will view her place in the water cycle differently to that of the engineer. For her, the nature of her reality is different in that she would want a more reliable source of water to live a healthy life for her and her family. It is these subjective notions of reality that is lacking in the NWRS2. Even so, and in all fairness, the NWRS2 is a strategy and not a specific tactic to tackle a specific problem. In this vein, embeddedness is possible by linking with communities and the research/scientific structures that generate knowledge through alternative research paradigms and on issues that do not fit neatly positivism and the natural sciences.

This highlights the notion of collective beneficiation (Huntington 1991; Hobson 1997), where government structures engage with communal and natural and social scientific structures to widen the scope of issues impacting on the country's water resources. This beneficiation can be achieved through routine (formal and informal) negotiations with other social and economic structures as well.

This specific type of interaction raises the issue of leadership. The NWRS2 notes that the DWS is leading its implementation. The Department of Water Affairs (2013: 102, 1) notes that: 'This NWRS2 provides the Strategy for how the water sector and its key institutions will achieve the strategic objectives' with the Department as the 'water sector leader.' According to the ambiguity theory of leadership, leadership is not a specific and viable scientific construction (Calder 1977 in Alvesson and Spicer 2011). This means that people define leadership as they see fit and depending on their context (Alvesson and Spicer 2011). That said, individuals could view the DWS's leadership of the NWRS2 in different ways. During fieldtrips we undertook for our various research projects, it is not uncommon to hear people say that government should provide them with water. I have never encountered an individual saying an irrigation board, or water user association or traditional leader, for that matter, should provide water. This indicates government's leadership role being constructed as that of 'ultimate provider' of water. It is also not uncommon to hear NGOs and interest groups complaining that government is not doing enough to supply water and protect the environment. This construction is of government as 'absconder of water provision responsibilities' and 'irresponsible environmental custodian'. This indicates the ambiguity of government's perceived leadership roles in the water sector. In light of the NWRS2, and the DWS's agency, an awareness of the various meanings people attach to leadership roles could potentially erode the Department's agential power and reflexive governing capacity. Something also has to be said about followers in this regard. Followers, whoever they may be, use their different meanings of leadership as

levers to achieve or gain something (Alvesson and Spicer 2011). An interest group using a specific meaning of leadership might do so to increase its standing in society. Individuals could also use the meanings to vent their frustration to a situation or at the extreme mask ideological commitments such as contempt for a corrupt government and its entities. It will not be possible to correctly interpret why people construct certain meanings of leadership. Yet, it is important for DWS officials to know that there is not just one warranted meaning of leadership and that people's different meanings could hold real world consequences for governing capacity. With this, a deeper understanding of knowledge and agency is affected in the NWRS2, which could stand the DWS in good stead.

The NWRS2's knowledge is based on a research environment that is dominated by natural scientists and researchers that were in the past employed by the DWS. From an empathy perspective, positivism is dominant because of the natural sciences' huge influence on research in the South African water sector. Learning comes into play when we look closely at the theory underlying the NWRS2—rational choice theory. It is not entirely impossible that, due to the perceived scarcity of water in South Africa (in terms of the volume of the resource not being enough to cater for the population and the country's economic development), the DWS would approach the NWRS2 from a specific scientific perspective. In other words, the Department's agency is likely to be informed by this positivist type of knowledge generation approach. The agency perspective would be to get as much economic benefit from the scarce resource; rational choice and cost-benefit analysis would be the foundations of the Department's agency in implementing the NWRS2.

2.4 The UNDP's Water and Ocean Governance Focus Area

2.4.1 Introduction

This analysis focuses on the UNDP's Water and Ocean Governance focus area. This focus area falls under the UNDP's Environment and Energy programme (UNDP 2014a, b, c). I analysed the webcontent of 15 of the UNDP's Internet websites that make up the focus area. These websites are entitled: Energy and Environment, Focus Areas, Water and Ocean Governance, Integrated Water Resources Management, Adaptation to Climate Change, Gender and Water, Mainstreaming, Human Rights, Water Governance Facility, What is Water Governance?, Shared Waters Partnership, Transboundary River Basin Initiative, Why Shared Waters Matter, Transboundary Water Management, Transboundary Waters Programme and the Water Integrity Programme. The Transboundary Water Management webpage, is a document authored by Jägerskog (2013). His essay contains information on how the UNDP view transboundary water resources, why it is necessary for states to cooperate on these shared resources and how to facilitate cooperation.

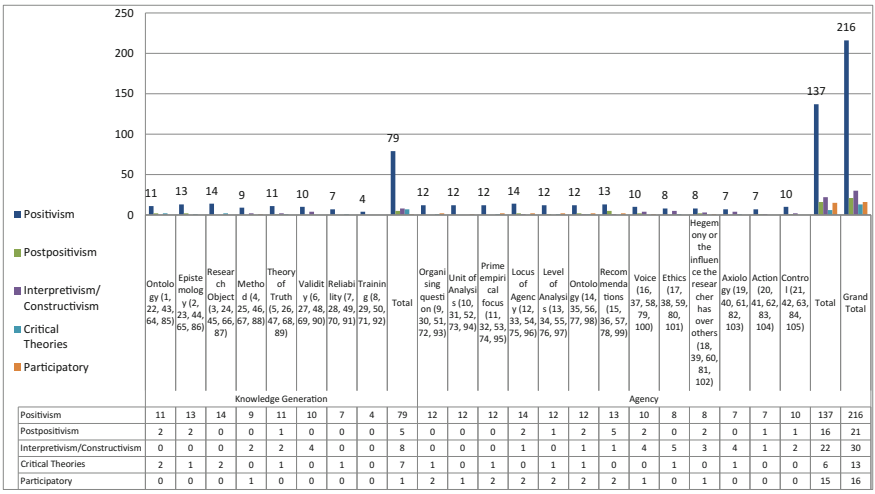
I decided to analyse the UNDP's Water and Ocean Governance focus area because the content of the websites is in line with a number of governance themes found in the South African water discourse. For instance, the gender component found has been a topic in the South African water discourse for some time (e.g. Schreiner and Van Koppen 2001; Rust and Hanise 2009) and is alluded to in the NWRS2. In 2014, South Africa also hosted a conference that discussed the matter of gender, water and development (Karar 2014). The same can also be said for other topics, like transboundary water resources management. South African researchers have been avid investigators of transboundary water governance and politics (e.g. Kistin and Ashton 2008; Turton 2005; Jacobs and Nienaber 2011; Meissner and Jacobs 2014; Meissner and Ramasar 2015). The themes found on the UNDP's Water and Ocean Governance website is therefore relevant to the South and Southern African context, not only from a thematic point of view, but also from a scientific perspective. South African scientists have engaged with these topics for a number of years (Meissner 2016b) with a pool of knowledge that will stand the rest of this study in good stead.

2.4.2 Paradigm Assessment of the Focus Area

In this section, I will discuss the results of the paradigm assessment of the Water and Ocean Governance focus area's web content. The portion consists of two parts; the first deals with the research paradigmatic meta-theoretical assumptions regarding knowledge generation and the second part looks into the assumptions on agency. Throughout the discussion, I will use examples for the various webpages to illustrate the points raised during the discussion.

2.4.2.1 Knowledge Generation

The research paradigm assessment indicates that the content of the UNDP's Water and Ocean Governance focus area is steeped in positivism (see Fig. 2.4). The metatheoretical assumption that scores the highest is the research object (14), followed by epistemology (13), ontology (11) and then the theory of truth (11). Validity, reliability, and training got scores of nine, seven, and four, respectively. A possible reason for the high score for the research object is the nature of the resource under consideration. As already indicated in the section on the NWRS2, water is one of the most abundant resources in the biophysical environment and considered an important building block of life on earth. Water is a chemical compound that is necessary for the production of goods and services in all spheres of the economy and it is also considered to have 'great power' for human beings; water is considered a magical force since it shapes, renews and nourishes earth, and life on it. We see water as the planet's lifeblood that pumps through it continuously (Gillings 2010). Said differently, water is something real that we can



	Ontology (1, 22, 43, 64, 85)	Epistemology (2, 23, 44, 65, 86)	Research Object (3, 24, 45, 66, 87)	Method (4, 25, 46, 67, 88)	Theory of Truth (5, 26, 47, 68, 89)	Validity (6, 27, 48, 69, 90)	Reliability (7, 28, 49, 70, 91)	Training (8, 29, 50, 71, 92)	Total	Organising question (9, 30, 51, 72, 93)	Unit of Analysis (10, 31, 52, 73, 94)	Prime empirical focus (11, 32, 53, 74, 95)	Locus of Agency (12, 33, 54, 75, 96)	Level of Analysis (13, 34, 55, 76, 97)	Ontology (14, 35, 56, 77, 98)	Recommendations (15, 36, 57, 78, 99)	Voice (16, 37, 58, 79, 100)	Ethics (17, 38, 59, 80, 101)	Hegemony or the influence the researcher has over others (18, 39, 60, 81, 102)	Axiology (19, 40, 61, 82, 103)	Action (20, 41, 62, 83, 104)	Control (21, 42, 63, 84, 105)	Total	Grand Total
Positivism	11	13	14	9	11	10	7	4	79	12	12	12	14	12	12	13	10	8	8	7	7	10	137	216
Postpositivism	2	2	0	0	1	0	0	0	5	0	0	0	2	1	2	5	2	0	2	0	1	1	16	21
Interpretivism/Constructivism	0	0	0	2	2	4	0	0	8	0	0	0	1	0	1	1	4	5	3	4	1	2	22	30
Critical Theories	2	1	2	0	1	0	1	0	7	1	0	1	0	1	1	0	0	1	0	1	0	0	6	13
Participatory	0	0	0	1	0	0	0	0	1	2	1	2	2	2	2	2	1	0	1	0	0	0	15	16

Fig. 2.4 Paradigm assessment of the UNDP's water and ocean governance focus area

sense through touch and taste. It is a concrete entity that can be measured, manipulated, predicted and, to a certain extent, controlled. We can have an independent relationship with water when we study and manipulate it. What follows from our interaction with water is that our epistemology is characterised by an objective reality when we research water as a substance and the effects a surfeit or scarcity of water have on society. When we research water and its multiple influences, we can separate it from us enabling us to control and predict it, and its 'power'. Said differently, water's biophysical properties translate into a positivist meaning for humans.

This positivism materialises in the focus area (UNDP 2014c) when it uses the global water cycle as the foundation to show the importance of freshwater and ocean resources. The UNDP (2014c) notes that these two domains are 'inextricably linked'. When describing the water cycle and the volume of water found therein, the UNDP uses facts such as; 97 % of the earth's water is in the ocean, and; 900 million people lack access to safe water with more than 2.7 billion people not having basic sanitation (UNDP 2014c). In the transboundary water domain, Jägerskog (2013) states that: 'Globally, about 2 billion people depend on groundwater, which includes well over 300 transboundary aquifer systems.' These figures are very close to certainty and objectivism. Another indication of the positivist paradigm found on the website is: 'Climate change, which is already altering the global water cycle at an unprecedented rate, adds further complexity to…challenges [faced by transboundary water resources] through its impacts on the timing, intensity and variability of rainfall, droughts and floods' (UNDP 2014d). Cause and effect relationships are put forward by the UNDP through these statements with absolute certainty with the causal narrative coached in empiricism using regularities

and facts. Regarding this, the UNDP (2014e) notes that competition for 'available water resources' is growing at a rapid rate because of 'ever-increasing and conflicting demands from agriculture, industry, and urban water supply and energy production.' Statements like these do not only show that the UNDP perceives water in concrete terms, but also the direct and linear links between elements of the biophysical environment and how a lack of water impacts on the human population. Cause is depicted in a strict Humean way in that the regular pattern of competition over water will result in ever-increasing conflict over water.

One of the entries on the website that has a critical theory paradigm profile, is the Gender and Water section. The UNDP notes that women and girls are the ones responsible for collecting and using water for household purposes in developing countries. It also notes that: 'Prevailing inequalities mean women typically have less means and capacity to cope and adapt and consequently bear a disproportional burden of increased competition and climate change induced consequences on water.' Because of this inequality, water managers need to take gender matters into consideration, according to the UNDP (2014f). The critical theories paradigm acknowledges power struggles in society as the nature of reality (ontology). The research paradigm also recognises and studies social struggles, freedom and oppression as well as power and control as an epistemological focus (Cox and Sinclair 1996; Lincoln et al. 2011). Even so, it would appear that when it comes to validity (the certainty that data truly measures reality) (Weber 2004), the UNDP falls back on positivism. For the critical theory paradigm validity is created when research creates action or participatory research creatings positive social change (Lincoln et al. 2011). This social alteration is put in the court of water managers as the top-down agents of gender mainstreaming.

The UNDP invokes integrated water resources management, benefit sharing, adaptive management and resilience; some of which I already discussed in the previous two case studies. Regarding climate change, and despite the lack of reliable regional and basin specific data and uncertainty in predictions, the UNDP (2014e) seems to know how to tackle the problem through resilience and adaptation. Both these concepts are put forward as having the potential of impacting positively on the Millennium Development Goals[2] (MDGs). For instance, the UNDP states that, by strengthening resilience, is an appropriate response to climate change threats (UNDP 2014g). The positivist theories of resilience and adaptive management are here guiding the appropriate measures needed to deal with not only the uncertainty inherent to climate change but also the attainment of the MDGs. This is irrespective of the uncertain action that needs to be taken.

[2]The MDGs are targets set in 2000 by 191 countries to eradicate poverty and other sources of human deprivation and to promote sustainable development. The target for achieving the MDGs is 2015. The goals are: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/Aids, malaria and other diseases; ensure environmental sustainability and develop a global partnership for development (UNDP 2003; Meissner 2004b).

A scholar that appears to have an influence on the way the UNDP generates knowledge, especially around the issue of transboundary water resources, is Anders Jägerskog. For Jägerskog (2003) there is a link between science and policy, or issues related to the management of water resources. He is of the opinion that the knowledge generated by scientists in the water politics discourse '…does not reflect an objective reality but rather a constructed reality' (Jägerskog 2003: 35). If this is the case, and the UNDP is referring to a large extent to Jägerskog's work, why is the UNDP's Water and Governance programme influenced more by positivism than by interpretivism/constructivism? After all, Jägerskog puts forward a constructivist argument to highlight the linkage between science and policy. Part of the answer is given by Jägerskog (2003), when he says that a state or nation is sometimes treated by International Relations as a singular and unproblematic unit, which is off-course, an oversimplification. Jägerskog's (2003) argument about states can also apply to an organisation like the UNDP; the UNDP is, after all, a creation of states.

If this is the case, ideology, and discourses informed by a specific ideology, will likely play an important role in the UNDP's identity and how the organisation views reality. The UNDP is, after all a political actor on the global stage populated by humans that work towards goals and aspirations. In other words, it is possible that the UNDP has a discernable collective ideology. One of the major initiatives under the custodianship of the UNDP is (at the time of writing) the MDGs, which has since 2015 been transformed into the sustainable development goals (SDGs). The MDGs had measurable (and thereby positivist-informed) targets. For instance, goal 7, target 10 was to 'halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation' (UNDP 2003; Meissner 2004b). Also, measuring progress towards the targets, including the SDGs, is done by measuring a country's economic performance by using positivist methods, such as statistics and surveys (e.g. Meissner 2004c). This positivist agenda might account for the overtly positivist way of knowledge generation by the UNDP that are likely to continue with the SDGs.

What is also interesting to note, from an analytic eclecticism perspective, is that Jägerskog (2003)—in his earlier study of water negotiations in the Jordan River basin—only considered the agent/structure divide found in International Relations. He did not consider the material/ideational divide. He uses the agent/structure divide as a framework for his thesis and as a tool '…in dissecting the negotiation process' (Jägerskog 2003: 54). Jägerskog (2003) leans on the theory of critical realism when he argues for a fusion between the agent and structure divide. A premise of critical realism utilised by Jägerskog (2003: 60) is that '[h]uman agency acquires meaning and occurs only in relation to already structured settings, which simultaneously constrain and enable actors since structures determine the range of possible action.' For him, agency is dependent on already established structures that constitute the potential for action. In line with Hay (1995), Jägerskog (2003) acknowledges that actors are partially able to transform structures through their actions. This implies that structures have a dominant influence over actors. Jägerskog's (2003) view of the agent-structure divide is in line with positivist prescriptions that treats the locus of agency in international affairs as a top-down

arrangement (Hobson and Seabrooke 2007), with structures at the top and agents at the bottom. What is also important to note is that Jägerskog's (2003) ontology is structuralist, which neatly fits the positivist paradigm (Hobson and Seabrooke 2007). This structuralist ontology can also be discerned in the Internet content of the Water and Ocean Governance focus area. For instance the topic of shared waters, the Stockholm International Water Institute (SIWI) in partnership with the UNDP states that: 'While a lot of progress has been made, 60 % of all transboundary basins still do not have any kind of cooperative management framework in place.' The Institute goes on to say that shared waters can be vehicles in promoting cooperation between countries (SIWI 2012). It is possible that the constitutive argument put forward by Jägerskog (2003) has had an influence on the idea that cooperative (i.e. agreements between countries) and biophysical structures (i.e. the river basin itself) will have a bearing on the conduct of countries' (i.e. actors) behaviour when sharing water resources. It is also no coincidence that, at the time of writing, Jägerskog is an employee at SIWI and the head of the Transboundary Water Management Unit (The World Justice Project 2014).

Even though positivism is dominant, there are also alternative paradigms visible in the UNDP's webcontent. I have already discussed the critical elements found in the Gender and Water component. There are interpretivist/constructivist metatheoretical assumptions regarding the method, theory of truth and validity contained in the arguments by Jägerskog (2014) on the importance of transboundary water management. For instance, regarding method, Jägerskog (2014) uses case studies from the Middle East and other parts of the world to substantiate his arguments. Although there are certain elements of interpretivism/constructivism, the arguments are grounded in positivism and specifically neoliberal institutionalism and neorealism. Regarding these two International Relations theories, Jägerskog (2014) notes that there are national bodies and legislative mechanisms to address conflicting demands for domestic water resources, but no institutional mechanisms exist to challenge transboundary problems. Neoliberal institutionalism argues that states prefer to cooperate rather than to seek relative gains. This cooperation takes the form of regime establishment to realise absolute gains rather than short-term individual achievements (Carranza 2014). By establishing a cooperative arrangement, like a river basin organisation that deals exclusively with a specific transboundary river, states could gain more than in the absence of such a body. In terms of neorealism, Jägerskog uses Earle et al.'s (2010) hegemonic politician's (Meissner and Jacobs 2016) model to explain the interaction among stakeholders in developing transboundary water management. According to the hegemonic politicians model, politicians are the most influential actors international rivers and determine the speed and direction of transboundary water management. All other actors are in a way subordinate to the wishes and preferences of politicians (Earle et al. 2010; Meissner and Jacobs 2016). Jägerskog (2014) developed the hegemonic politician's model together with Earle (Earle et al. 2010), and is therefore likely to adhere to the model's basic assumptions.

2.4.2.2 Agency

From the paradigm assessment (Fig. 2.4) we see that positivism also scored the highest regarding agency. The metatheoretical assumption with the highest score is locus of agency (14), followed by recommendations (13) and organising question, unit of analysis, prime empirical focus, level of analysis and ontology (scoring 12 each). Voice, ethics, hegemony, axiology, action and control scored the lowest, ranging in scores from seven to 10. In the case of Gender and Water, the UNDP utilises feminist theory to arrive at positivist prescriptions for the mainstreaming of gender in water resources development. The UNDP calls for the involvement of both women and men in integrated water resources management initiatives to increase a project's effectiveness. In addition, through a gender perspective, and involving women, sustainable development is possible. The MDGs will be difficult to attain without a gender perspective (UNDP 2014f). As mentioned above, these initiatives, or goals, are all within the UNDP's mandate. To a certain extent, a critical paradigm is used as a foundation to argue for reaching specific preferences attached to the UNDP's mandate. This is quite ironic since critical theory assumptions are utilised to put forward positivist prescriptions (e.g. recommendations).

Where the UNDP also uses alternative research paradigms and theories to inform achievable actions, is in the domain of human rights and water resources management. Here interpretivist meta-theoretical assumptions about the influence of knowledge types or the researcher, axiology, the products of research and control are quite visible. The UNDP states that it supports a human rights-based approach in sanitation, water supply and water management and governance. This is done by 'developing experience, lessons learned and guidance' and 'supporting the work of the Independent Expert [sic.] on the issue of human rights obligations related to access to safe drinking water and sanitation' (UNDP 2014h). The 'guidance' and 'support' of independent experts is transactional knowledge that is utilised to deliver water services. It is clear the research generated seeks to influence practices. Training can also be mandated translating into political action with knowledge shared between the researchers and participants (independent experts) (Lincoln et al. 2011). Even so, from the information at hand, it would appear as if the exchange of knowledge is more of a top-down affair from the UNDP's side than it is about the mutual exchange of knowledge.

Even so, through the description of a case study in Kenya, the UNDP's Water Governance Facility supports the capacity development of villagers in the Nyanza Region. This is to enable them to participate effectively in water sector reform and use anti-corruption and complaint redress tools. Villagers are also encouraged to report water mismanagement practices (UNDP 2014h). This case is, to a certain extent, an example of the participatory paradigm influencing the UNDPs activities. Be that as it may, the actions to improve governance are informed by positivist structures of governance (i.e. reform and anti-corruption). Benefit-sharing, which is neo-liberalist, is also used as a way to improve dialogue (UNDP 2014h). There is dialogue to bring about change to better the human condition. This seems to be the main organising issue that forms the foundation of the initiative and the prime

empirical focus is to supply order and welfare maximisation (Hobson and Seabrooke 2007) through dialogue with people from different spheres of society. It would appear as if the relationship between the villagers and the UNDP is horizontal, but the information being supplied to the villagers are western liberal notions of governance and management. There is a horizontal relationship in that dialogue is entered into by villagers, but the knowledge has a top-down western and liberal content.

Where the UNDP also base its agency on positivism is in its discussion of the concept and meaning of water governance.[3] The international organisation notes that water governance can address issues of equity and efficiency, is catchment-based water administration, integrated water resources management approaches and the need to balance water between society and ecosystems (sustainable development). Water governance, as defined by the Water Governance Facility, is also an important ingredient for the formulation, establishment and implementation of water policies, legislation and institutions. Water governance also clarifies the role of government, civil society and the private sector as well as their responsibilities regarding the ownership, management and administration of water resources and services (UNDP and SIWI 2014a). It appears as if the UNDP and SIWI take an *a priori* stance when it comes to the effects of governance (i.e. equity, efficiency, better water administration and the necessity for integrated water resources management). The theoretical assumptions held by the two organisations are rooted in positivism since the unit of analysis focusses on structures of rule (Hobson and Seabrooke 2007) (e.g. water policies, legislation and treaties). The prime empirical focus of the concept is to supply order and welfare maximisation (Hobson and Seabrooke 2007) through water policies, legislation (read the political élite) and treaty institutions. The locus of agency is top down (Hobson and Seabrooke 2007), since the agency component of the concept 'water governance' focuses much more attention on governments than other societal actors, either implicitly (i.e. water administration based on catchments) or explicitly through policies, legislation, government and administration. There is a structuralist ontology in that 'water governance' constitutes actors' actions through the 'clarification of the roles of government, civil society and the private sector and their *responsibilities* regarding ownership, management and administration of water resources' (emphasis added). Examples of these responsibilities are dialogue between sectors, stakeholder participation and conflict resolution, having women playing a role in water management, getting rid of bureaucratic obstacles and corruption, regulating prices and subsidies and creating tax incentives and credits (i.e. welfare maximisation) (UNDP and SIWI 2014a). These are also implicit recommendations founded on an exclusive positivist and problem solving approach. The agency component is presented

[3]Water governance is defined by the political, social, economic and administrative systems that are in place, and which directly or indirectly affect the use, development and management of water resources and the delivery of water at different levels of society. Importantly, the water sector is a part of broader social, political and economic developments and is thus also affected by decisions outside of the water sector' (UNDP and SIWI 2014a, b).

in such a way that the constitutive relationship between water governance, and the various actors is 'true', and will become a reality should water governance, as outlined by the UNDP and SIWI, be implemented.

This positivist approach to agency is discernible in the case of the Shared Waters Partnership between the UNDP and SIWI. The purpose of the Partnership is to 'prevent conflict over shared waters by building trust and promoting cooperation' (UNDP and SIWI 2014b). The objective of the Partnership is to create a multi-stakeholder platform[4] to increase political will and strengthen riparian commitment in regions where water caries hold the potential of becoming a source of conflict. Another mainstay of the Partnership is adaptive management with cooperation being fostered through opportunities to learn, codify, and exchange lessons to utilise water as a tool for cooperation (UNDP and SIWI 2014b). Again, positivism and problem solving theory play a functional role.

Technical studies on the link between water resources and conflict will support and facilitate agency within the Partnership. These technical studies are purely positivist in nature. As mentioned, the agency component of the Shared Waters Partnership is purely positivist. On this positivist plane, the UNDP and SIWI govern while riparian countries benefit. For instance, the partnership '[h]olds high level government events, such as parliamentary conferences, to build multi-country awareness of shared water body issues' and '[s]upports processes to enable and finalize regional frameworks' (UNDP and SIWI 2014b). Governmental structures therefore take centre stage in the technical assessments supporting the minimisation of perceived conflict in shared water resources.

The technical studies also raise the issue of ethics as a meta-theoretical assumption. Here ethics refer to the relationship and interaction the researcher has with the subject and the consequence of research on a population (Schwandt 2007 in Lincoln et al. 2011). The technical studies, it would appear, investigate the biophysical environment or the river basin and the associated biophysical characteristics that influence water scarcity and/or abundance. There also seem to be an interpretivist/constructivist and participatory paradigmatic element inherent in the

[4]Warner (2005) states that multi-stakeholder platforms have been adopted as a logical companion to integrated water resource management, since integrated water resource management is difficult to model and needs a different decompartmentalised institutional arrangement. Also of interest is that the uptake of multi-stakeholder platforms goes back to the United Nations Conference on Environment and Development (UNCED) World Summit in Rio de Janeiro in 1992, where calls were made for dialogue and co-management of common pool resources (Warner 2005) such as shared water bodies. Together with integrated water resource management, multi-stakeholder platforms are used as ways to deal with increasing degrees of variety and variability. By involving a diversity of perspectives in water management it 'is hoped to hold the key to more integrated and sustainable outcomes' (Warner 2005: 2). This promise appears to be used as an a priori knowledge construct that informs the UNDP's and SIWI's Shared Waters Partnership strategy. That the UNDP and SIWI use multi-stakeholder platforms in multiple contexts or shared water situations, indicates that the rationale behind multi-stakeholder platforms are regarded as a universal belief based on the experience of others and what is considered a justifiable belief (Bonjour 1999) coming from experts propagating multi-stakeholder platforms in an international organisational structure.

technical studies: to reveal special problems (Guba and Lincoln 2005; Lincoln et al. 2011). Since these are technical studies, it is not entirely impossible that they rely a lot on positivist methodologies. It would also appear as if the technical studies guide the potential influence researchers have over others or their hegemonic role when conducting the technical inquiries. The research, and not the researcher *per sé,* is influential. There is also a postpositivist element in that decisions can be made from the analyses produced (Guba and Lincoln 2005; Lincoln et al. 2011). Even so, since cost-benefit calculations form part of the technical studies and the researchers are objective (Guba and Lincoln 2005; Lincoln et al. 2011), the actions will have to come from riparian countries and make an 'informed' decision based on the technical studies' conclusions. This also implies that the technical studies produce law-like statements since the link between water resources, conflict and cost-benefit analysis should influence the riparian countries' decision makers. The Shared Waters Partnership also develops scenario modelling tools as ways and means for riparians to better understand transboundary waters in the context of peace, security and economic development (UNDP and SIWI 2014b). The fact that economic development is included in the context, indicates that the prime empirical focus also rests on welfare maximisation (Hobson and Seabrooke 2007). The technical studies are also an indication of who governs and who benefits (Hobson and Seabrooke 2007)?

This particular positivist organising question gives rise to the unit of analysis, which are riparian countries the geographical area of shared aquifers and other shared river basins. The unit of analysis is the state or the structures of rule created by the state, while the prime empirical focus is the supply of order (Hobson and Seabrooke 2007) through cooperative agreements and regional initiatives on shared water resources. To be more specific, the Partnership '[b]uilds capacity of transboundary water institutions in dispute resolution, public participation and management' (UNDP and SIWI 2014a, b). As already mentioned, this also indicates a bias towards the production of cooperative structures that will influence the behaviour of actors in shared water arrangements. This thinking is in line with Jägerskog's (2003) treatment of the agent/structure divide discussed earlier.

2.4.3 *The UNDP's Webcontent Through the Lens of Analytic Eclecticism*

That positivism is dominant throughout the Water and Ocean Governance focus area is an indication that the focus area is characterised by paradigmatic limitation. That is not to say that we understand less about international water governance, the actors, their relationships with one another, the issues they address and the dynamics behind their actions. The research conducted by scientists over the years informing the knowledge and agency of the focus area have generated useful insights as well as pragmatic ideas on how to create opportunities and ameliorate problems. Yet, the

prior assumptions about the importance of certain actors (e.g. hegemonic politicians) and structures (e.g. cooperative arrangements in transboundary rivers), are the foundations on which knowledge is generated and agency affected. The problem with this arrangement of knowledge and agency is that, after a while, the assumptions are considered law-like principles by other researchers and practitioners. That said, the assumptions are not critically questioned or problematized and become dogma. The 'permanent' character of the website does not help either, in fostering a dogmatic character around the focus areas assumptions and statements. The UNDP also endorses the services of, and align its thinking, with scientists that uphold a positivist paradigm. It is not likely that they will question their own research paradigms and theories and consequently their beliefs about water management in various situations. This result in an increase in the sophistication of arguments within the positivist structure of knowledge generation that, in turn, influences structures constituting agent-bound research. Because of this, the UNDP and SIWI work towards the establishment of seemingly appropriate structures (e.g. regimes, treaties and good governance principles) in a bid to influence actors' behaviour. Looking at the content of the focus area it is clear that relationships between issues are laid out but not on a research paradigm level. Where critical theory and interpretivism/constructivism come to the fore, for instance, (e.g. in gender mainstreaming and human rights, respectively), it is used to explain a structural phenomenon (e.g. gender inequality in the political economy of water management) and not to change this structure and emancipate those suffering as a consequence of the existence of the structure (e.g. women). The explaining of the structure is used to inform the actions of the UNDP and that is to make gender part of integrated water resources management. The (gender inequality) structure, influencing agent-bound research, informs the UNDP's agency around gender mainstreaming.

The UNDP do not problematize the root cause of gender inequality, human rights and corruption's complexity. For instance, international organization does not question the very structures that should be put into place to address the matters the Programme is propagating. It is not entirely impossible that the structures the UNDP, and to a certain extent SIWI, are putting forward as solutions could be part of the problems' root cause the structures are trying to address.

That said, should we discard the research paradigmatic ways the UNDP goes about generating knowledge and developing and implementing agency? Not at all! What needs to happen, tough, is to investigate the relationship between alternative research paradigms and how these relate to the various issues the UNDP is tackling through the Water and Ocean Governance focus area. Here alternative theories could go a long way in discovering hidden relations between paradigm-bound theoretical elements. For this to happen, it will be necessary to balance *a priori* knowledge justifications with *a posteriori* knowledge generation. For instance, justifying knowledge claims based on research conducted in one region, like the Middle East, and then to argue that the knowledge is applicable to other regions with prevalent water scarcity, should be balanced with empirical investigations into the matter of water scarcity leading to conflict. To do this, the UNDP could problematize the various theories and concepts it puts forward to

generate knowledge (e.g. integrated water resources management, sustainable development and multi-stakeholder platforms). For this to happen, it might be necessary to ask what alternative theories are out there that could highlight the hidden problems inherent in the dominant theoretical stances, and how do we use these alternative theories to help explain the complexity of the issues being addressed by the UNDP and its partners? What could also be highlighted, is to investigate how material and ideational mechanisms, integrated with structural and agent mechanisms influence actors' behaviour and the structures they put in place. The UNDP could strike a more balanced approach between simplification (e.g. structures influencing agents, positivist theories explaining issues and a set of dominant actors involved in water management) with the problematization of the concepts, assumptions and analytical principles the UNDP is familiar with. Within the ambit of the focus area as it stands currently, the UNDP puts forward a simplified view water management's nature and extent and how to react to the problems besetting water management. This simplification rests on a reductionist notion that the implementation of structures will go a long way in addressing water management problems.

The analysis of the UNDP's Water and Ocean Governance focus area reveals the utilisation of a number of theories to highlight and explain the (paradigmatic) ways of tackling water and ocean governance. Two theories are implicit and two are explicit. The implicit theories are neoliberal institutionalism and the hegemonic politicians' model. The explicit theories are integrated water resources management and sustainable development. Neoliberal institutionalism and the hegemonic politicians' model are both grand problem-solving theories, while integrated water resources management and sustainable development are middle range problem solving theories.

For neoliberal institutionalists, economic interdependence and democracy reduce conflict (Oneal and Russett 1997). This is exemplified in the focus area through benefit sharing's promotion in transboundary river basins. A central tenet of neoliberal institutionalism, is that the reduction of conflict through the causal mechanisms of economic interdependence and democracy does not rest solely on the shoulders of states. As such, states are not the only important actors in world or regional political arrangements. Non-state entities are just as important in the scheme of things. These non-state entities include international organisations (Viotti and Kauppi 1999) (e.g. the UNDP, SIWI and the GWP) and (transnational) interest groups like Greenpeace and the WWF (Neme 1997; Meissner 1998; Finnemore and Sikkink 1998). This means that states are not the only actors with autonomous preferences (Stone 1994; Nel 1999). Autonomous preferences links with the decision making of political actors based on the choices available to them (Offe 1997). Also important, with respect to autonomous preferences, is that non-state entities can influence the actions of states and the political leadership of states and organs of state (Viotti and Kauppi 1999), like international organizations. What this influence from non-state actors means, is that states are open to external influences from non-state entities. Because of the erosion of the autonomous preferences and the 'solidity' of states, international affairs resembles a cobweb of interaction instead of

a billiard table on which actors clash and push each other out of the way when interacting. This spiderweb image implies that the relationships between actors are highly complex and interdependent (Heywood 1997; Stern 2000). An important norm in international affairs is autonomy, which replaces state sovereignty by neoliberal institutionalism. By emphasising autonomy, the theory is able to recognise non-state entities and their importance in world politics (Heywood 1997). This means that the theory highlights autonomous preferences and autonomy as key concepts instead of sovereignty. Non-state actors, states, and individual politicians are key actors for the theory.

Looking at states, neoliberal institutionalism notes that states are not everywhere the same; they are not 'like units' in terms of their societal set up and government apparatus. Despite these differences, cooperation between liberal democratic states is quite normal because the international order is seen as liberal (Stone 1994). It is for this reason that the theory propagates the spread of democracy through the international system as a means to ameliorate conflict even in transboundary river basins. This entails that liberalism is a causal mechanism for cooperation and liberal democratic states are key agents in the spread of liberalism.

Cooperation in the international system takes place through regimes. A regime is a 'form of institutionalised cooperation in the international system' (Stone 1994: 441). Regimes and norms go hand-in-hand. For Krasner (1982: 185) '[i]nternational regimes are defined as principles, norms, rules, and decision-making procedures around which actor expectations converge in a given issue area.' Put in another way, cooperation takes place through regimes meaning that regime formation bring about cooperation in political systems. For instance, the UNDP advocates gender mainstreaming as a type of procedure to bring about a gender inclusive environment that will lead to better water resources management.

The propagation of certain procedures to construct cooperation is also discernible with integrated water resources management and sustainable development. Integrated water resources management and sustainable development are used as procedures, and ideals, to bring about better water management and less conflict as well as more cooperation in transboundary river basins. Because of their procedural nature, integrated water resources management and sustainable development are middle range problem solving theories.

It is in the transboundary river domain that the hegemonic politicians model, as an understanding of stakeholder interaction (Jägerskog 2013) starts playing a role. The hegemonic politicians' model was developed by Earle et al. (2010) to indicate how stakeholders interact in a complex system. Jägerskog (2014: 50) argues that: 'Advances in transboundary water management are urgently needed and there is a range of ways to overcome the challenges. A key insight is to understand the various actors at play in the transboundary domain.'

The hegemonic politician's model rests on a number of basic assumptions. In transboundary water management three actor clusters play an important role: the water resource community, the research and academic community and politicians. The most important grouping is the politicians. The model is depicted as three interconnected and revolving gears (Earle et al. 2010; Meissner and Jacobs 2016).

Since the politicians are the most influential in a transboundary river basin, their represented gear is shown as the largest. The size of the politicians' gear is proportional to their role because they allocate values in the system with immense influence over domestic water management (Earle et al. 2010).

Why are politicians so influential? It is because state sovereignty and the rights that go with sovereignty resting on politicians' shoulders. If the 'politicians gear' should stop turning, the entire system would grind to a halt and collapse (Earle et al. 2010). The causal mechanism is this regard is politicians burdened with decisions influenced by state sovereignty and its rights that can bring about a move towards better cooperation or instigate conflict. This means that there is a powerful elite, with the national interest at heart, that governs in a top-down manner.

The water resource community include government and private sector businesses, water managers, water consumers, and civil society actors that implement transboundary strategies. Another function of this community is that it also develops solutions to water challenges. When and where politicians establish cooperative structures the water resource community steps in by utilising its understanding of transboundary water governance (Earle et al. 2010). Politicians act through the sovereignty norm to establish collaborative structures. The understanding of transboundary governance issues of the water resource community assists in the establishment of the collaborative structures. In addition, of importance is that the structures politicians formulate, depends on riparian state relations. These relations can limit the water community's role (Earle et al. 2010). The interacting politicians influence the structure's form and consequently the water resource community's role because the community does not have the same sovereign rights as the politicians. Therefore, the rights bestowed upon politicians limit non-state actor actions in transboundary river basins. The sovereignty rights place politicians in a privileged position relative to the water resource community that do not have these rights. The sovereignty rights, therefore, cause a hierarchical system with rules as to who can construct interactive structures and who cannot.

The third community consists of the researchers, which includes academics, international financial institutions, development partners, and donors. The members of this community develop theories and aim to explain, influence and improve governance based on observations from the water resource community (Earle et al. 2010). This means that theories are causal mechanisms according to the hegemonic politicians' model. Theories have a positive impact on transboundary water governance. Academics, as experts, with specialised knowledge are trusted to produce and deliver well observed theories, are well known in their field, and can, through theories, improve governance. This improvement is not a done deal. Researchers introduce their ideas to the water resource community hoping for a durable structure from the non-state level. Researchers as outsiders observe and comment on processes from a distance. Some researchers enjoy better insider status/access to the other two communities than other researchers. An example is the development partners that cooperate with the state (Earle et al. 2010), like SIWI and the GWP collaborating with the UNDP. Politicians will only adopt recommendations from researchers if these are in line with the politicians' pressures and goals. Of

importance, is that the political community is heterogeneous due to multiple realities and pressures at the national level (Earle et al. 2010).

Taking this heterogeneity of the political communities into further consideration together with the dominant role politician's play, it would appear as if the hegemonic politicians' model is a mix of neoliberal institutionalism and neorealism. This is significant for both are problem solving positivist theories. Because of this, the causal mechanisms and narratives are constructed along neat Humean cause and effect arguments. This is a visible complementarity between neoliberal institutionalism and the hegemonic politician's model. This complementarity means that states and their representatives are important in (transboundary) water governance, but will collaborate through stipulated structures and rules with non-state actors in the research and water resource community. The focus of both theories is on actors, their structures and the structural norm of state sovereignty and the rights it bestows on politicians (Table 2.3).

How do these theories understand the water problems they are confronting? From the analysis of the web content, it is clear that empirical analyses are utilised only in so far as to describe the extent of water problems faced by human populations. Said differently, the empirical evidence to describe the problem was to put the challenge into perspective as it manifests in reality and linked to the large number of individuals facing water scarcity in a degrading natural environment. What is therefore unpleasant about the water difficulties is that large numbers of, often poor people, face water scarcity on a daily basis. To ameliorate the problem, regimes among states, to be implemented by water managers, are necessary.

In short, the hegemonic politicians' model notes that change in transboundary water management strategies is dictated by hegemonic power relations. There are various degrees of collaboration and conflict evident in the relations. Again, politicians are the most important actors in bringing about strategies, because if all the gears engage at once, the system jams (Earle et al. 2010). This jamming of the system means that, in a transboundary context, neither the water community nor the research fraternity can bring about the consent of the politicians through autonomous preferences. There has to be a collaborative effort for strategies to be considered, let alone succeed. In the context of gender mainstreaming and other national or local-scale initiatives, the researchers play a more prominent role in the UNDP's efforts to confront water governance challenges. For instance, it is the theories of feminism, integrated water resources management, and sustainable development that inform the UNDP's practices.

Now that we know what the research paradigmatic and theoretical basis of the UNDP's Water and Ocean Governance focus area's webcontent is, it is possible to bring the contrastive space into play. One of the central features of the above theoretical analysis is the norm of state sovereignty and the rights it bestows on politicians to act in the water governance domain. The contrastive question should not be; why this particular norm on which to base our understanding, but why the norm of state sovereignty rather than norms that has a social inclination instead of a state-centric connotation? To ask this question brings into the fold the role of social norms, produced by a number of societal actors and not a norm that derives from

Table 2.3 Neoliberal institutionalism and the hegemonic politicians' model's ontological and epistemological structures

	Concepts	Actors	Independent variable	Interceding variables	Dependent variable	Causal mechanism
	Autonomy Politics as the allocation of values in society State sovereignty and its rights Collaborative structures Understanding transboundary governance issues Riparian state relations Theory Politicians' pressures and goals Heterogeneity	Non-state actors such as international organisations Individual politicians as allocators of values Liberal democratic states Water resource community Water research community	Politicians Water resource community Water research community	Sovereignty and its rights produce pressures and goals for politicians Understanding of transboundary governance issues Insider status of water researchers	Collaborative structures Influence of the water resource community Theories	Autonomous preferences Liberalism Politicians burdened with decisions influenced by state sovereignty and its rights Politicians acting through sovereignty to establish collaborative structures Interacting politicians influence the form of the structure Sovereignty limits the rights of the water resources community Insider status of researchers Politicians' interests constitute the uptake or acceptance of research recommendations Reality and pressures from various sources constitute heterogeneity
Connections	Autonomous preferences, sovereignty and politicians as allocators of values connect *positively* with collaborative structures and other regime principles like integrated water resources management and sustainable development to mitigate water scarcity problems.					
Complementarities	Liberal democratic principles of collaboration on a global or regional scale results in collaboration, integrated water resources management and sustainable development.					

the state-system, influencing the role and power of politicians. A theory that will assist in deepening our understanding is constructivism that emphasises the role and importance of social norms.

2.4.4 *Theory for Practice: Social Constructivism*

To illustrate an alternative agenda, I will use an alternative theory from a research paradigm other than positivism as an example that could enrich explanations of real world problems around water governance in the UNDP's focus area. The theory is social constructivism. I will illustrate how this theory can give a richer explanation to the content of the focus area's website. I will, therefore, further analyse the content using social constructivism. Social constructivism can be seen as a middle ground explanation of world politics (Adler 1997; Weber 2014). Constructivist social theory rests on three principles. The first is that 'people act toward objects, including other actors, based on the meanings that the objects have for them' (Wendt 1999 cited in Jacobi et al. 2014). This is the principle of social knowledge. The second principle is that 'the meanings in terms of which action is organized arise out of interaction'; the principle of social practice. The third principle holds that 'identities [and interests] are produced in and through "situated activity"' or the principle of social identities and interests' (Weber 2014).

For social constructivism, actors do not have stable identities and interests but shape and construct these through intersubjective engagement with structures (Chandler 2013) and other actors. Ideational elements or intersubjective beliefs include ideas, concepts, and assumptions that are widely shared by people (Jackson and Sørensen 2003). The theory is the opposite of the conceptualisation of norms as shared, pre-formed and rational interests (Chandler 2013; Weber 2014). Here norms are defined 'as shared (thus social) understandings of standards of behaviour' (Klotz 1995: 14 cited in Meissner 2004a). According to Chandler (2013: 218): 'Neo-liberal theorists [take] a positivist perspective to the study of international regimes and institutions, which were thereby understood to develop as part of the pursuit of existing self-interest: as minimizing transaction costs, facilitating the spread of information, and overcoming uncertainties of international cooperation.' Social constructivism argues that there is too much emphasis on the materialist interests and motivations of actors, usually states. Said differently, positivist theories, like neo-liberalism, are too agent-centric in its approach to explaining international politics. According to neoliberalism and neorealism, agents are permeated with 'instrumental rationality'. This rationality means that states seek their power or interests (Hobson 2000). Social constructivism emphasises the social environment in which actors interact. It is also through this social environment that they construct their self-identities and their perceptions of policy and governance preferences or needs. This social environment contains norms, identity, and culture. Norms have a constitutive as well as regulative effect indicating the social expectations for proper behaviour (Chandler 2013). This means that through the lens of

social constructivism there is a shift in focus from absolute rational power and interest seeking behaviour to the interaction between all sorts of actors in a social environment where rationality plays a much smaller role.

What is more, social constructivism does not deny the importance of power and interests. According to Finnemore (1996: 157 cited in Chandler 2013) social constructivism '…asks a different and prior set of questions: it asks what interests *are*, and it investigates the ends to which and the means by which power will be used. The answers to these questions are not simply idiosyncratic and unique to each actor. The social nature of international politics creates normative understandings among actors that, in turn, coordinate values, expectations, and behaviour.' In this, we see the constitutive influence of normative issues on politics as well as governance.

From this we can see that social constructivism tries to make sense of social relations by describing the construction of the socio-political world through human practice (Du Plessis 2000). Instead of seeking power or interests, states are constrained by social normative structures (Hobson 2000). Normative structures considers what the most appropriate or desirable form of a community or state might be (Hobson 2001). Norms play an important role in the construction of actors' identities. Interests change as norms reconstruct identities, which constitute to changes in policies (Smith 1997; Price 1998). Not only do norms play an important role, non-state actors do too. Social constructivism believes that non-state actors operate in a transnational manner and exist as a community of political engagement in world politics. They impact meaningfully through networks and can teach governments what appropriate behaviour to follow (Price 1998). Norms make individuals and other non-state entities into agents and therefore give actors an opportunity to act in this world; and they use all means at their disposal to do so. Onuf (1998: 4) states that: 'These means include material features of the world. Because the world is a social place…rules make the world's material features into resources available for agents' use.'

2.4.5 Discussion

If analytic eclecticism is setting its sights on addressing real world problems and there is a link between research paradigms and theories and practice, what is the issue that has to be problematised? This is a not an easy question to answer; the UNDP and its respective partners are, after all, tackling real world problems (e.g. gender inequality, water scarcity, the dearth of cooperation over transboundary water resources and so on). The UNDP also generates knowledge from multiple research paradigms, for instance positivism, critical theory and interpretivism/constructivism and more than one theory such as feminisms and neoliberal institutionalism. These research paradigms and theories also inform the UNDP's and its partners' actions or agency. So what needs to be questioned or problematised?

We now know that positivism is the dominant paradigm. The UNDP and its partners also use positivism to constitute and inform their agency. Most of the time the positivist ontology of reality is informed by material structuralism (e.g. measuring progress towards the MDGs is a case in point). It is this dependency on positivism or the scientific method that permeates thinking and practice that needs to be questioned and problematised. Science is, after all, based on the commitment of constant critique (Kurki and Wight 2013), and by critiquing the positivist ontology and epistemology through social constructivism could aid in a better understanding of why the UNDP and its partners think and act the way they do. Said differently, why is there this over reliance on positivism, and so what?

A logical answer to this question is that the UNDP is unaware of other research paradigms and theories that could be utilised to inform knowledge generation and subsequently agency. This could also be the case for SIWI. Another explanation is more deep seated and complex.

As already mentioned, people's actions are always in relation to objects. These objects include other actors as well (Wendt 1999). Actions are based on the foundation of the meanings that the objects have for people. The global water cycle is an important foundation for the UNDP to base assumptions upon regarding the importance of water resources. The water cycle is seen as the life blood of the planet and although this is the case, not every human has access to water and sanitation. This 'fact' shows that access to water is a practical problem that needs to be addressed to improve the collective human condition. Added to this meaning is the 'fact' that climate change is aggravating the situation. Climate change is a certainty and this necessitates further action to address the problem. The knowledge around the water cycle and climate change's influence, leads the UNDP towards specific actions. These activities rely on the interaction between the UNDP and scientific knowledge, and more specifically positivism or the scientific method. That said, the UNDP's social practice is based on an objective ontology (e.g. the water cycle and the absolute certainty of climate change) and the positivist epistemology (e.g. the scientific method). The UNDP's identity is that of a rational actor that uses rational science (albeit *a priori*) to inform its knowledge and practices. What this also means is that the UNDP constructs its identity through the intersubjective engagement of two biophysical structures—the water cycle and the earth's climate.

Since it takes a positivist position in generating knowledge, it is possible that the UNDP's identity and interests are informed by the rational scientific community, even those that are not natural scientists, like Jägerskog. This type of 'science' assists in constituting the UNDP's identity and interests. The UNDP's over reliance on positivism stems from the meaning it attaches to water and the global water cycle, climate change and an undesirable collective human condition as well as interaction with the ideas, concepts and assumptions generated by the natural scientific community (e.g. climatologists and meteorologists). That climate change has a negative influence in the water cycle is a widely held belief based on scientifically verifiable evidence (positivism). The UNDP therefore takes a deliberate causal analysis of the problems facing water resources. This analysis is a positivist or empiricist form of causal analysis. What is more, it is not impossible for the UNDP

and its partners to advocate this type of causality (Kurki 2006) where the number of people living without water are, for instance, taken as the foundation of causal analyses and not the causal stories of the circumstances under which they are without water.

According to the UNDP, the negative influence of climate change manifests in competition over water resources and an increasing demand on the resource. In this way, the UNDP constructs a global water governance structure that is inherently conflictual and anarchic,[5] which is worsened by global climate change. To explain this further, the UNDP perceives the water cycle as the life blood of the planet, which is being negatively affected by climate change and this increases demand for, and competition over water that hampers order and welfare maximisation (e.g. Hobson and Seabrooke 2007). The structure constructed by the UNDP compels it to behave in a number of ways. Firstly, the UNDP acknowledges the real existence of the water cycle, an undesirable human condition, shared water systems and climate change, and its negative impacts on these systems. Secondly, the UNDP is certain about the facts it, and its partners, base their knowledge upon. Thirdly, competition over water in transboundary water systems is a real possibility. The norm for the UNDP is, therefore, to act as an actor that does not question the *real* existence of these phenomena. The UNDP behaves as if it is rational because it relies on *a priori* knowledge foundations and particularly scientific knowledge systems.

Other research paradigms and theories (e.g. critical theory and feminisms) play a role but only to inform or give credence to the undesirable human condition the UNDP explaining. It can be argued that feminist explanatory elements are informing the UNDP's positivist agential role and identity. The UNDP does not take an *a posteriori* stance towards feminism to change gender inequality and emancipate women. Instead, to get rid of gender inequality a positivist theory—integrated water resources management—is invoked to deal with gender inequality in the water sector. This indicates the 'epistemological superiority' of the positivist form of gaining knowledge (Kurki 2006: 197), in that critical perspectives are not the starting point of changing unequal social structures. The biophysical structures of the water cycle and the global climate are also linked to the gender discriminatory structure the UNDP is addressing. The UNDP uses integrated water resources management, linked with gender, as a mode of practice to exercise its power over water managers. It would appear as if the UNDP does not use feminisms as a means to form a participatory paradigm to guide and produce social change. The UNDP has instrumental rationality in that it utilises theories as a way to explain the exact nature of reality. The UNDP does not use these theories as a representation of reality, but as an exact copy of the world. Because of this 'exactness' attached to the social environment, the UNDP further strengthens its identity as a rational actor as well as an organisation compelled to work towards the

[5]Anarchy means the absence of a central authority over states in the international system (Viotti and Kauppi 1999).

betterment of the collective human condition. This is most probably the strongest expectation the UNDP has of itself, and the partners it is working with.

In terms of the interface between knowledge generation and agency, it would appear as if there is a mutually constitutive relationship between the UNDP's expectation of the type of knowledge generated by the epistemic community and the epistemic knowledge influencing the UNDP's instrumental rationality. It is clear that rational theories (e.g. integrated water resources management, adaptive management, resilience and benefit sharing) are influencing the UNDP's view of reality and agency because the theories are put forward by the UNDP and its partners as solutions to address problems confronting global water governance. This particular type of theory also constitute via the UNDP's promotion, the most desirable form of water governance. For the UNDP it would be against the norm to utilise research paradigms and theories other than positivism and integrated water resources management, resilience, adaptive management and benefit sharing. Incidentally, these are all research views and theories that originated from Western, and more specifically, European cultures. It is not harsh to say that through positivism and positivist theories, the global water governance community is informed to function along the lines of a European identity, even if the problems facing water resources and water governance are geographically distinct from the continent. This European epistemic cultural bias comes to the fore in the Kenyan case study where villagers are taught that good governance comes about when you blow the whistle on corrupt practices. In other words, the human practice of whistleblowing is bringing about a socio-political world that has a European blueprint. What is more, the norm of whistleblowing gives the UNDP agency to act in the developing world. Whistleblowing, and adoption thereof as a norm, is in effect a material feature of Europe that is being transplanted onto the developing world through the UNDP's activities.

Jägerskog's (2003) earlier theoretical approach can be described as structural constructivist. This was the case when he researched and reported on transboundary water negotiations in the Jordan River in the early 2000s. Since then, it would appear as if he has taken a more (structural) liberalist perspective (Jägerskog 2013), especially regarding the UNDP and SIWI partnership on transboundary water resources management. By referring to Jägerskog's work, the UNDP constructs knowledge from a specific community and ideational structure.

In my opinion, it is very likely that the UNDP and SIWI is reacting towards Jägerskog's (2003, 2014) neo-liberalist-based research to develop their respective mandates. It is also not impossible that Jägerskog (2014) acts towards the two organisations mandates and wrote from a neo-liberalist perspective. The UNDP and SIWI are, after all, neoliberal institutions. Put differently, the social knowledge generated in this way is informed just as much by the theoretical structure (mandate) of the UNDP and SIWI and Jägerskog's structural theoretical outlook. The social practices of the UNDP and SIWI and Jägerskog, as a social scientist, inform the meanings of the respective actions as well as their mutual interaction. In this interactive mode the actors' intersubjective engagement with their mandatory structure (UNDP and SIWI) and ideational structure (Jägerskog's (2003) knowledge of transboundary water negotiations and his (Jägerskog's 2014) treatment of

the constitutive effect structures can have on actors), inform the UNDP's and SIWI's identities and interests. It is interesting to note that Jägerskog (2003) moved from a structural constructivist approach in the early 2000s to a structuralist neoliberal and neorealist approach when interacting and informing the UNDP and SIWI on transboundary water matters. Be that as it may, the interaction between the three actors' ideational elements/intersubjective beliefs plays an important role in their relationship. These elements and beliefs manifest in a variety of forms such as mandates, concepts (e.g. regimes and hegemonic politicians model) and assumptions (e.g. neoliberalism and neorealism).

Not only does the UNDP have a relationship with a specific part of the epistemic community that informs its instrumental rationality. The emphasis it places on the attainment of the MDGs also gives the UNDP instrumental rationality informing the UNDP's activities to overcome uncertainties around international cooperation. Through measuring and classification, the UNDP reduces uncertainty around the MDGs, or at least their attainment. Uncertainty in the transboundary domain is also substantially reduced by taking on board the structure constituting agent behaviour put forward by Jägerskog (2014). The positivist constructed environment informs the UNDP's identity, perceptions of policy and governance needs (e.g. putting policies in place to reach the MDGs and regimes for transboundary cooperation). That said, positivism or positivist theories trump any other theory like the feminisms and political ecology in constructing the UNDP's identity and interests.

After all said and done, the UNDP and its partners are generating knowledge and operating from a positivist perspective of reality. There is an absolute certainty about the knowledge constituting reality and the actions being implemented to react to this specific reality. By using social constructivism and interpreting the way in which knowledge is generated and actions implemented, shows a mutually constitutive relationship between positivism and positivist theories, the outlook of the UNDP and its partners as well as a specific part of the epistemic community on water governance. Social constructivism showed that this absolute reliance on a single research paradigm and a limited set of positivist theories could be part of the problem the UNDP and its partners are addressing. It is not impossible that the positivist outlook is strengthening a certain top-down dynamic between the UNDP and its partners on developing countries to implement European practices that could be out of kilter with the reality of developing economies. Positivism is, after all, a top-down and structuralist research paradigm in the agency domain and it would appear as if the UNDP (implicitly) insists and relies on the claims made by positivism.

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Chapter 3
Active Substantiation: A Theory of Water Research

3.1 Introduction

In this chapter, I will present a theory of water research in South Africa based on the three case studies presented in the previous chapter. In this theory, called active substantiation, I will explore some of the reasons why the three case studies show such a strong bias towards positivism on which they base knowledge generation and agency. I argue that cognitive processes are part and parcel of the constitutive reasons for the bias towards a certain research paradigm. I organise the chapter by first outlining active substantiation and why the bias towards certain research paradigms are 'active'. I will then outline cognitive processes, starting with the analogy of the brain as a loom. This is followed by two case studies; the link between 'water is life' and water on Mars and the tragedy of Air France Flight 447. With these two cases, I show the mutually constitutive relationship between research paradigms and theories and beliefs, expectations, ideas, ideologies and perceptions. It is through this interlinkage that active substantiation becomes a vital element in cognition. In the chapter's penultimate part, I outline some of the ways humans institute active substantiation. I will end with a conclusion.

3.2 Active Substantiation

Beliefs, emotions, expectations and perceptions are important aspects that govern, guide or determine the lives of individuals: scientists included. Such cognitive and psychological elements play an significant role in research, and more specifically water research. Psychological features can have powerful influences on the way in which water researchers conduct research and how scientists engage practitioners.

One such psychological feature is active substantiation. Active substantiation can be described as 'a general tendency to seek or interpret information in a way

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that is consistent with existing beliefs or expectations' (Marks and Fraley 2006: 20), as well as the perceptions we have of others, our environment and the relationships we have with others and our environment. The concept can give us a clearer picture as to why certain research paradigms and theories are dominant while others are ignored or shunned. According to Koriat et al. (1980), people tend to ignore or avoid information that counters or contradicts their beliefs. People also assign more legitimacy to confirming information and less credance to disconfirming information (Pyszczynski and Greenberg 1987; Marks and Fraley 2006). This leads people to acquiring mores confirming evidence to accept a hypothesis than they would for disconfirming evidence to reject the hypothesis (Marks and Fraley 2006). Active substantiation implies that precedence (attention and recollection) is given to information that supports existing beliefs over information countering these beliefs (Baron 1991; Marks and Fraley 2006). Stated in yet another way, active substantiation is 'the seeking or interpreting of evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand' (Nickerson 1998: 175). This is not only the case in everyday life, but also present in the sciences. Scientists may seek positive cases to test hypotheses. In order to do so, they will ask questions that confirm rather than refute the hypothesis (Skov and Sherman 1986; Marks and Fraley 2006). Active substantiation can, therefore, be considered a constitutive element in scientific enquiry.

Active substantiation can be a strong enforcer of expected research outcomes and conclusions. Not only does it relate to research, it can also link with anecdotal and empirical evidence. The bias towards certain information is 'active' because it involves people substantiating information. To elaborate, 'active' means that people, through actions, are actively and often subliminally, substantiating information even if the information is incorrect. Agency is, therefore, linked to the actions constituting active substantiation. Actions include attention to certain or specific things, like concepts, dominant theories, evidence supporting hypotheses; recollection of past experiences; the seeking of certain types of information; the interpretation of such information and the sensing of the environment to confirm the information is actually the correct information. People actively look for *confirming information*, noticing the information, recalling it and processing it. There is therefore agency in the way we engage information. Aspects that have the power to cause actions would include perceptions, beliefs, expectation, views and ideologies. For instance, the belief in a phenomenon constitutes the actions or behaviour of people (Marks and Fraley 2006). People are likely to act in such a way so that they can give credibility to the belief. It is, therefore, not the sources of the bias that is important, but more the effects the bias has on scientists' thinking and subsequent behaviour.

Active substantiation can have an emancipatory (positive) and a disenfranchising (negative) influence. Active substantiation can free us from the contradictory evidence or information that goes against our beliefs. Should we decide that a certain solution to a problem is necessary, it can free up time needed to solve the problem. People have already decided that they know the solution to the problem. In other words, we will not waste time looking for other (more) suitable solutions. Instead, we will jump right in and start addressing the problem. The downside of this is that

the correct or optimal solution might not be chosen, either accidently or deliberately. Another dimension that could be ignored is the creation of opportunities. Since the 'problem' dominates our attention, we could actively suppress the creation of opportunities. This could enslave us in terms of choices regarding opportunities and problems.

3.3 The Active 'Loom'

Why would we see information that does not confirm our beliefs, expectations and perceptions as threatening? One reason could be ego-related in that we could perceive ourselves as part of the 'in-group' or the group that sets the trends. This generates a perception that we are in a position of power and can change things for the better. Another reason could relate to envy in that the information we receive is better formulated than our thinking. The information we are discounting could take us out of our comfort zone. Whatever the case may be, emotions play an active and constitutive role in active substantiation.

To put this statement into context, in 1887 Frederic Meyers used the metaphor of the brain as a loom. He wrote: 'Let us picture the human brain as a [large factory], in which thousands of looms, of complex and differing patterns, are habitually at work. These looms are used in varying combinations; but the main driving-bands, which connect then severally or collectively with the motive power, remain for the most part unaltered' (Myers 1887: 503). Sherrington (1942 cited in McIlwain 1984: 417) took this analogy a step further and likened the brain to an 'enchanted loom'. The brain is 'a sparkling field of rhythmic flashing points with trains travelling sparks hurrying hither and thither…an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern though never a[…] [surviving] one; a shifting harmony of subpatterns.' That the brain is never developing 'a [surviving]' pattern indicates that it is free to create patterns about realities. We are therefore not always bound to established patterns and rational choice.

Yet, considering the notion of active substantiation, it would appear that we are to a certain extent bound by our own cognitive processes taking place in the brain. This is shown by Westen et al's. (2006) study on political judgement and decision making. They used functional neuroimaging to indicate the occurrence of active substantiation in different parts of the brain. During the study, active substantiation was associated with the ventromedial prefrontal cortex, anterior cingulate cortex, posterior cingulate cortex, insular cortex and the lateral orbital cortex of the brain (Westen et al. 2006). Drew Westen, the director of the study, noted afterwards that: 'We did not see any increased activity of the parts of the brain normally engaged during reasoning. What we saw instead was a network of emotion circuits lighting up, including circuits hypothesized to be involved in regulating emotion, and circuits known to be involved in resolving conflicts' (EUHSC 2006). Active substantiation happens in the brain where the neural network acts like an enchanted

loom with emotions playing their role together with reasoning, which brings us to cognition and its role during active substantiation.

Cognition is about the senses. We see, hear, smell, taste and feel things that build our knowledge and understanding on a constant basis. Not only do we learn ourselves, other humans and the physical environment also teach us. History is a case in point, where history constitutes the memory of systems influencing human behaviour (Rosenau 2006; Cilliers 2000, 2001; Meissner and Jacobs 2016). Cognition (including emotion and reasoning) also gives us agency. This agency is a product of the brain, which implies that the brain is central in the agential scheme of things. Cognition that processes or develops knowledge and understanding in the mind (Hornby 2005; Blomberg 2011), helps us bring about change in the natural and social environments.

Who we learn from and what we learn have a bearing on our beliefs, expectations, ideas, ideologies, perceptions and views. Here I am particularly concerned with research paradigms and theories. Research paradigms and theories are abstractions we formulate to make sense of our environment. Even though research paradigms and theories are abstractions, they can be immensely powerful, as I have already mentioned. Research paradigms and theories, together with beliefs, expectations, ideas, ideologies and perceptions are mutually constitutive. They can reinforce each other or undermine one other either subliminally or consciously.

3.4 Water on Mars

It is in this mutually constitutive relationship between research paradigms and and beliefs, expectations, ideas, ideologies and perceptions that active substantiation becomes a vital element in cognition. I will illustrate this by a number of examples. The first is the notion ‘water is life’. Water has meaning at different scales—from the individual to the functioning of the global ecosystem. There is a bias towards the good things about water because we associate positive things with life. Water on Mars is a case in point. Why are we fascinated about water on, or in, extra-terrestrial environments? What does it mean for us that there is water elsewhere in the Universe? Does it have to do with future colonisation of such worlds by humans or is there something more to it? Since President Barak Obama announced plans in 2010 to land a human on Mars, scientists have paid more attention to our closest planetary neighbour in the solar system. This enlivened focus has taught us new things about the so-called red planet, especially microbial life. Liquid or fluid water is a key element for the possibility of life on Mars. Fluid water is needed for the processes of life. Finding liquid water on Mars increases chances of finding other life forms in the solar system, which will show whether or not we are alone (the only living beings) in the universe (Goldin 2010). This touches on the emotional element of loneliness in the vast expanse of the universe. But there is also a practical side to why we look for liquid water on Mars. If we want to colonise Mars, we will need water.

The example of Mars brings into focus the scientific connection between water and its importance for life processes. By stating that 'water is essential for sustaining life on earth', an impression is created by, for instance, part of a scientific article dealing with water politics (Jägerskog 2003; Khalid and Bagum 2013) that water is the same as life. Why should there be a need to have a statement like this in a study on water politics? Firstly, water, and its link with life, has been scientifically established; without fluid water, life is not possible. The statement is used to indicate the actual importance of water for life on our planet. It is in a sense used by the authors to give credence and legitimacy to their study. It is the first salvo, so to speak, in arguing that the author's 'wisdom' that follows is true or correct for it invokes an element of reason and empathy.

The recommendations for corrective action in a situation where water is seemingly under threat flows from this type of reasoning and it flows in a direct cause and effect relationship. These recommendations are usually aimed at governments or government officials as government has to play a central role in implementing such recommendations (e.g. CDE 2010). The belief exists that a scientifically-proven, or scientifically backed statement, is more likely to change behaviour. People will therefore use the 'water is life' statement in an attempt to trigger changes in behaviour. Science is just as much concerned with rules, disciplines and authority as it is with the discovery and generation of new knowledge. The rules and authority manifest in the neat and tidy ordering of what has been discovered. The presentation of the new knowledge follows specific rules and the generation of authority to give legitimacy to the new knowledge. Said differently, this is the foundation of active substantiation.

Even so, water can mean different things to different people under diverse circumstances. The positive aspects of water, as mentioned before, are contained in statements like 'water is necessary for survival'. Yet, there is also an ambiguous meaning to water. Water is one of the most abundant resources on the planet, but not all water is suitable for human consumption, like sea water or the Dead Sea's water. Water also has meaning as a necessity. Without water the necessary means of producing economic commodities are not possible. Water can also have meaning that manifests in emotions such as fear and awe (e.g. Roth et al. 2006). Under certain circumstances, we may even put up barriers to isolate us from water, such as dykes protecting low lying areas against flooding in the Netherlands and other low-lying countries (Roth et al. 2006). Water can also be an ingredient of events leading to disaster. Water's role in a disaster is the topic of the next discussion.

3.5 Air France Flight 447

On 1 June 2009, Air France flight 447 crashed into the Atlantic Ocean while on route from Rio de Janeiro, Brazil to Paris, France. The aircraft was an Airbus A330, one of the most sophisticated aeroplanes to fly (BEA 2012; O'Connor and Preston 2012). The disaster was to date one of Air France's worst accidents. All 228 people

on board perished. It came to light that flight 447 flew through a thunderstorm across the Atlantic Ocean prior to the accident. While travelling through the storm, the aircraft started sending fault messages to Air France Headquarters in Paris. The messages are designed for maintenance when the aircraft undergoes routine inspection and maintenance by technicians. The messages showed that, within a period of four minutes, the Airbus suffered 24 critical faults. The first message indicated that the autopilot of the aircraft had disengaged. The pilot had to take control of the aircraft as its automatic safety systems shut down in succession. So what caused the system failures? One of the messages indicated that the aircraft's computer lost the ability to calculate airspeed. Pitot probes measure airspeed on aircraft. These probes are externally mounted forward facing hollow tubes under the flight deck. This particular aircraft had three Pitot probes. On flight 447, all three shut down; the tubes can malfunction if blocked. Flying at 35,000 ft, ice can cause the probes to stop working properly. Yet, the probes have heaters to de-ice in such an event. Scientists discovered that, at 35,000 ft, super-cooled liquid water was present. This type of water is a strange phenomenon of physics. Purified water, at well below freezing point, remains in a liquid state. Ice will only form around impurities or air bubbles. Experiments later showed that super cooled liquid water, which is quite pure over the ocean at high altitudes, was able to block the heated Pitot probes because the probes acted like an impurity enabling the water to form. The Airbus was, therefore, unable to measure its airspeed hence the repeated failure of systems (Scott 2010), and the co-pilots were unable to control the aircraft's flight path after the systems failed (BEA 2012).

The tragic case of flight 447, is an example where water is not life, but a component of *tragedy*. Active substantiation can instill in us a perception that water can only bring about good and positive things. Statements like 'water is life' is intuitive in the sense that repeated active substantiation of the statement instil in us a high degree of certainty that this must be so in all cases where water is involved. The same can be said of a statement like 'good and sustainable governance can save water.' If that is so, then it holds that 'bad and unsustainable governance can waste water.' But what if we have a band of water thieves that are good at governing the sustainable theft of water resources and water infrastructure? It is a case of good and sustainable governance applied by people with bad intentions. The words 'good', 'governance' and 'sustainable' are intuitive in the sense that they invoke a positive predicted outcome without reasoning that it can also cause a negative unpredictable consequence. We take such statements for granted, just as we take the physical water resource for granted. We do not see any problem in making such statements. In fact, we act as if such dictums are normal and thought-provoking. Yet, within them lurk the psychological meaning we attach to the words and the phrases. It is our unconstructive taken-for-granted perceptions of such maxims that hide from us their other meanings, and in essence other elements that make up reality.

3.6 At the Behest of Active Substantiation

If the basic wisdom of 'water is life' gets reinforced by active substantiation, what else is out there that can be at active substantiation's behest? Ignoring active substantiation, may lead us to statements like: the scientific method is the only reliable way of generating new knowledge, or, positivism is the only legitimate research paradigm to investigate reality, or, one theory is enough to give sufficient answers and that research paradigms are far removed from reality, or, theory belongs in the classroom and not the world of practice.

How do people institute active substantiation? There are three ways through which this is done: hegemonic alignment, adaptation to existing knowledge structures and progressive conformity. Through agency, beliefs, expectations, ideas, ideologies and perceptions play a critical role. Agency, together with the psychological elements, colludes in the form of actions. The first action is hegemonic alignment. Hegemonic alignment happens when people that are in a subordinate relational position align their beliefs, ideas and perceptions with that of people that stand in a position of power (a hegemon). Subordinate individuals do not necessarily share the same ideology as the hegemon. They can, however, align other psychological elements, such as beliefs and perceptions, to that of the hegemon. If not fully aligned, then at least to a certain extent, but just enough to be in a position to get something from the hegemon. This 'something' may not necessarily be material; it can even be a sense created in the hegemon that the subordinate share his or her beliefs, ideas, perceptions, ideologies and views. The purpose of hegemonic alignment is to get something from the hegemon, whether it is recognition, praise, friendship, psychological and emotional support, well-being, protection, or a sense of worth. Hegemonic alignment manifests in the sciences when specialists are not questioned, when people always go back to the same expert for advice or opinion, take the sage's advice at face value (seen as always valid and reliable) and publish the specialist's work irrespective of the quality thereof. Hegemonic alignment happens at the individual or group level between the scientist and another individual that are in a perceived leadership position.

Active substantiation also occurs when scientists adapt to existing knowledge structures. The knowledge structure is in the form of institutions and power wielders. These powerful individuals or groups can either control research funds or are individuals that set the tone and direction of the research agenda. Conforming to existing knowledge structures implies that these structures are not being questioned. People do not engage with the knowledge structures in a critical fashion and merely take them at face value. A possible reason why this is the case is that people are satisfied with the structure and trust it to such an extent that they do not have to question it. Another reason could be that scientists get enough rewards, either in a material or psychological form, to conform to the knowledge structure. The knowledge structure's form and function make sense to people. This can be because they are unaware of another structure that could replace it, or have a vested interest in it. This makes their adaptation to it easier. All-in-all, they do not have to discover

different things or be innovative because the knowledge structure gives them comfort. To widen discovery of things would, in part, entail questioning the knowledge structure. It is after all the knowledge structure that tells us what is acceptable and/or unacceptable to talk about and to discover. Power is wielded in this way and the future of the type of knowledge that is produced is controlled. Scientists accept knowledge structures because it gives them a neat framework for doing science. It simplifies and guide work processes to address day-to-day problems. Should these structures be clear and visible, people have a better sense of what to do in certain situations.

The third action is progressive conformity. This action has to do with how scientists interact with the content of information (e.g. popular articles, scientific articles, conference proceedings, workshop presentations, etc.). The interaction takes place on a psychological level when discourses get infused with emotions (e.g. awe, boredom, confidence, contempt, curiosity, excitement, hope, hysteria, jealousy, joy, loathing, passion, pride, satisfaction, wonder, zeal and zest). We do not only read and write with our rational minds. We also read and write with our emotional minds. Emotions become part of the discourse to strengthen the discourse's image as a worthwhile cause to pursue. What should also be taken into consideration is that the discourse can carry some weight as long as it is documented. If the information comes from 'experts' (even if they have seemingly masked expertise or experience), the information is taken as a legitimate discourse. As soon as the information is concretised (in document form), it is legitimised with the author's emotions and perceptions as well as the reader's. The legitimacy of the text is a psychological construction. The information or the discourse also becomes infused with predictions of positive outcomes because people automatically attach legitimacy to the information without questioning it. This is to further advance its legitimacy and to give it a contemporary flavour. It is also to put into context the information at hand in line with the dominant ideology. An example of progressive conformity is the current South African water research agenda. Concepts the agenda deems worthy of mentioning in steering action influence the water research agenda (e.g. integrated water resources management, adaptive management, equity, equality, stakeholder participation, good leadership, management agency, and so on). As scientists in ever-increasing numbers start to conform to the dominant water research agenda, the less need exists to question the content of research or the researchers. Since most of the researchers are from a positivist background and persuasion, the research is coined in terms of problem solving, control and prediction instead of critical theory or the participatory paradigm. According to Spegele (2014), the former conforms to the naturalist approach of research while the latter is the emancipatory attitude. The naturalist approach describes and analyses water resource management in an objective manner. The emancipatory way of studying water resource governance and politics includes any theory, discourse, research paradigm or approach that transforms, transfigure or liberate political communities (Spegele 2014). The latter research paradigms are not involved in the water discourse because they are unknown. Where and when they are known, they are ignored because the dominant ideology demands the solving of

practical problems through top-down means or the naturalist approach. The conformity to the water research agenda is progressive because the more researchers conform, the more they give credence to the water research community and legitimise its trajectory down the seemingly correct path.

3.7 Conclusion

I believe that if we are serious about progressing to solve problems in the water sector, we will need to start viewing the way in which we conduct research differently. We do not merely have to invoke a different research paradigm or theory. We have to fundamentally start investigating the hidden meanings of the pronouncements we make and how we talk about the discourse. A tinkering with governance and political structures will take us further back from the goals we want to achieve. Critical theories, with their emancipatory agenda, are in addition not enough. Neither is the participatory paradigm. We need to start looking behind the façade of the discourses, their hidden meanings and begin to uncover the mundane basics of the meaning of things when we talk about water. We also need to start questioning the so-called sages, for, as gatekeepers, they can play an active or subliminal part in the promotion of active substantiation. Our focus needs to include the small and insignificant aspects of our relationship with each other, our environment, and water. This will take time. While scientists find comfort in active substantiation, resistance to new ideas will remain. It is only through the erosive effect of time that these comfort zones will get broken down so that researchers see things in a different light. Yet, scientists can start questioning current thinking; involve different disciplines, research paradigms and theories in their research. What follows in the next chapter, is a framework for analysing research through the utilisation of different research paradigms with the ultimate aim of creating research that will hopefully better inform decision-making.

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Chapter 4
PULSE^3: A Framework for Analysis

4.1 Introduction

In this chapter I present and justify the PULSE^3 framework for analysis as an alternative way of analysing and conducting research on water resource governance and management and related matters pertaining to these issues, like climate change. The framework is my alternative to current water research. In the first part of the chapter, I outline the rationale for PULSE^3, which is based on the dominant bias research scientists have towards the positivist research paradigm. I then go into PULSE^3's characteristics and what the framework is able to analyse. Under the characteristics, I present the framework's components; the research paradigm assessment, the ethos of analytic eclecticism and the repertoire of theories. I then outline a process to operationalise analytic eclecticism and the repertoire of theories. After this, I conclude the chapter.

4.2 The Rationale for PULSE^3

Positivism has difficulty dealing with fundamental social processes such as ambiguity, uncertainty, paradox, contradiction and causal relationships. A healthier appreciation of these elements is necessary to address the challenges the South African and international water sectors are facing. Humans are affected by the environment (Meissner 2003; Gillings 2010) and have an impact on the environment. Positivist theories are not well equipped to explain and deepen our understanding of these aspects and needs to be supplemented with other research paradigms. It is here where the inclusion of interpretivism, critical theories, and the participatory paradigm is needed. This will assist us in bettering our understanding of events and the practicalities associated with situations. This is PULSE^3's main foundation.

To move ahead with the integration of various research paradigms, we need a framework to address the concerns outlined so far. PULSE^3 was developed to add

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value to research endeavours and to assist in the creation of opportunities, instead of focusing on problem solution only. PULSE^3 fills a particular research paradigm and theory niche. It assists practitioners in deepening their understanding of real world challenges. PULSE^3 is the abbreviation for People Understanding and Living in a Sustained Environment. The cube denotes three forces: thinking, shaping, and change. Individuals think, shape and cause transformations. The natural environment shapes and affects changes, influencing human society and the way we live in the environment (Berger and Luckmann 1966; Giddens 1984; Meissner 2003; Kooiman and Bavinck 2005; Gillings 2010). The purpose of PULSE^3 is not to make point predictions or impose control on research endeavours and the agency emanating from such activities. The framework's purpose is rather to assist practitioners in understanding phenomena, situations, issues, and relations. PULSE^3 also helps to explain environmental impacts on human actions in the face of change, ambiguity, uncertainty, paradox, and contradiction.

4.3 PULSE^3's Characteristics

PULSE^3 has the following characteristics. Firstly, it is not devoid of theory or denies the existence of theory. Theory has a role in practice and by acknowledging this relationship, PULSE^3 enriches theory and practice. I attempted to write PULSE^3 in such a way that it is not too abstract and laden with difficult concepts that practitioners will have trouble in understanding. If the product is too cumbersome, it will struggle to translate theory into practice (Hoffmann 2003). Furthermore, PULSE^3 does not take an exclusive positivist stance. The product will miss a lot if it does, and we might be too surprised by surprising events that was not foreseen. PULSE^3 emphasises the role of various research paradigms and theories. By doing this, it propagates the use of forecasting (Hoffmann 2003) instead of prediction.

PULSE^3 is able to analyse practices, plans, projects, and programmes on a research paradigmatic level to highlight their inherent metatheoretical and theoretical gaps. Theory influences policies, practices, and programmes. Said before, theory influences how practitioners see the world, their place in the world as well as the possibilities for changing the world. Nevertheless, not all theories are good at everything. Realism, which places emphasis on states and their leaders, can be a good theory to employ in defining a particular problem. Yet, when it needs to present solutions to the problem, it might not be up to the task (Hayes and James 2014). For Hayes and James (2014: 401): '…theories actually embody logics or particular modes of thought that are reflected in the thought processes of [practitioners] in the real world. The theories can therefore be understood not just to explain actions and outcomes, but to actually embody shared patterns in how actors understand the world.' Practitioners are enclosed in a layer of open and hidden theoretical assumptions. They are also influenced by generalised empirical observation, tentative or firm deductions as well as working explanations that bring about theoretical perspectives. It is easy to see theory at work in the policy process

(Morgan 2003). Just look for those familiar definitions or conceptualisations that describe structures and the political behaviour of actors. In water governance and politics, the concepts 'pivotal state' (e.g. Ashton and Turton 2009; Sebastian and Warner 2014) and 'hydro-hegemony' (e.g. Turton 2005; Zeitoun and Warner 2006; Zeitoun 2007), are, for instance, employed to describe inter-state relations in transboundary river basins. These concepts are derived from the realist and neo-realist concept 'hegemon'. Nevertheless, practitioners will not always follow a theory to the letter in their interpretation of situations and their interactions with other actors. Yet, a certain theoretical way of thinking will play a role in relations and how systems are governed (Morgan 2003). We saw this with the three case studies where adaptive management, for example, played an implicit and explicit role in the climate change adaption strategies and the UNDP's Water and Ocean Governance focus area. This is not to say that PULSE^3 will be the be-all end-all that will solve the inherent gaps found in the thinking and knowledge generated and spred in the water sector. Anything but! PULSE^3 has its own weaknesses and gaps and by acknowledging this is a step in the right direction because it opens the real possibility of improving the framework.

PULSE^3 recognises entities such as individuals, interest groups, scientists and private companies as powerful actors alongside that of states, their governing apparatus and leaders. This recognition of actors' relevance, other than states, will give value to these entities, their role in society and the fundamental social processes they enact. PULSE^3 also recognises psychological elements such as emotions and their importance in driving individual and societal relations. Such an appreciation will play a role in the development of scenarios that are not dominated by state entities and their leaders only. By acknowledging psychological elements will also assist us in moving away from positivist explanations and towards a more interpretivist research agenda. We are focusing and relying too much on the predictive value of social theories by comparing them with positivist natural science theories. Social science theories have explanatory value. If we start focusing on theories' explanatory value, we will better understand the drivers behind phenomenon and situations and how these shape society and issues. Psychological elements have a role to play in such developments. This will assist in advancing more insightful policies, programmes and projects. Predicting the outcome of these actions will be of lesser importance. What follows is a rendition of PULSE^3's three components: the research paradigm assessment index, the ethos of analytic eclecticism and the repertoire of theories.

4.3.1 Component #1: Research Paradigm Assessment

Research paradigms are not permanent features of the scientific landscape. They get torn down and are replaced by other alternative paradigms (Eisner 1990; Weber 2004; Lake 2013). For Eisner (1990: 89) alternative research paradigms are '…views of mind and knowledge that reject the idea that there is only one single

epistemology and that there is an epistemological supreme court that can be appealed to settle all issues concerning Truth.' Yet, a specific research paradigm, such as positivism, can persist for some time. This persistence leads to the research paradigm becoming the dominant world view influencing policies, projects and programmes through active substantiation. This is currently the case with research in South Africa's water sector. This is not to say that positivism is dominant. Interpretivist elements will be present here and there. Yet, the research agenda will revolve around positivism.

The difference between positivism, postpositivism, interpretivism/constructivism, critical theories and the participatory paradigm is the foundation of the paradigm assessment (Lincoln et al. 2011). The differentiation can help profiling research inherent in policies, programmes, and plans. This profiling will determine the extent of policies, programmes, and planes' positivism, postpositivism, interpretivism/constructivism, critical theory, and participatory paradigmatic stance (see Table 4.1). The paradigm assessment tool takes into consideration the manner in which knowledge generation is treated by a programme, project or policy as well as agency. I define agency in this regard as any action discussed within a programme, project or policy that involves human action to set in motion general or specific ideas, operations or recommendations. A note on the 'positivist' way of determining the influence of paradigms in policies, projects and plans will suffice. So far, I have argued for a move away from pure positivism to a more inclusive ontological and epistemological view of studying reality in the water sector. Because of this argument, some commentators might accuse me of double standards when looking at the paradigm assessment component of PULSE[3]. The research paradigm assessment tool follows a quantitative methodology. I believe that methodological pluralism is the way to go if we want to understand the ontologically complex social and biophysical environments. Quantitative methods can point us to interesting patterns of observable data, which is the purpose of the paradigm assessment component. Yet, for us to explain the patterns of data, a qualitative approach is just as necessary because it highlights the causal processes that are taking place in a more distinct manner (Kurki 2006).

To determine the extent of the research paradigm underscoring a policy, programme or project there is a simple scoring system. The project can be an environmental impact assessment of a large dam project or a strategic issues management initiative of a corporation. The research paradigm underpinning the action is scored against the presence or absence of the research paradigms' metatheoretical elements in the text of the document reporting the assessment or initiative. A value of 0 = absent, 1 = present. In case more than one element is present, a score of 1 is awarded to all the assumptions. It is possible, for instance, for both positivism and interpretivism to exist in one research endeavour. Alexander Wendt, considered an interpretivist, says that he is ontologically an interpretivist, while he is epistemologically a positivist (Wendt 1999; Meissner 2016). It is, therefore, not entirely impossible to come across positivist elements in his interpretivist work. A combination of more than one research paradigm in an assumption is also possible. They will then receive equal weight. The red number in

Table 4.1 Paradigm assessment index

Knowledge generation					
Metatheoretical assumptions about	Positivism	Postpositivism	Interpretivism/constructivism	Critical theories	Participatory
Ontology (What is the nature of reality?) (Creswell 2007; Lincoln et al. 2011)	The researcher and reality are separate (Wendt 1999; Weber 2004) There is only one identifiable reality. Research is there to control and predict nature (Guba and Lincoln 2005; Lincoln et al. 2011). (**1**)	A single reality (Weber 2004) can never be fully understood. We will never fully understand the nature of the reality or how to attain a full understanding. This is because there are hidden variables and a shortage of absolutes (Guba and Lincoln 2005; Lincoln et al. 2011). (**22**)	The researcher and reality are inseparable (life-world) (Weber 2004). Realities are mental constructs. They are social and experienced based, local, specific, constructed and co-constructed. The realities also depend on the form and content of the person holding such realities (Guba and Lincoln 2005; Lincoln et al. 2011) There are multiple realities which are dependent on the individual (Guba 1996; Lincoln et al. 2011). (**43**)	There is a constant power struggle and human nature operates in this world. Interactions between individuals and groups are in the form of privilege and oppression. These interactions are based on ethnicity, race, socio-economic class, gender, mental or physical abilities as well as sexual preference (Bernal 2002; Giroux 1982; Kilgore 2001; Lincoln et al. 2011). (**64**)	A participative reality exists where there is a link between subjective and objective reality that is co-created by the human mind and the surrounding landscape (Guba and Lincoln 2005; Lincoln et al. 2011) There is also a freedom from objectivity emanating from a new understanding of the relationship between the researcher and others (Heshusius 1994; Lincoln et al. 2011) A subjective-objective reality exists. 'Knowers can only be knowers when known by other knowers'. A paradigm is founded on participation and participative realities (Heron and Reason 1997; Lincoln et al. 2011). (**85**)

(continued)

Table 4.1 (continued)

Knowledge generation					
Metatheoretical assumptions about	Positivism	Postpositivism	Interpretivism/constructivism	Critical theories	Participatory
Epistemology (What is the relationship between the researcher and the things being researched?) (Creswell 2007; Lincoln et al. 2011)	Objective reality exists beyond the human mind (Weber 2004). (**2**)	We can only approximate nature. Research and statistics gives incomplete data (Guba and Lincoln 2005; Lincoln et al. 2011). (**23**)	Social reality is constructed through the actor's reference frame to the setting in which it is located (Guba and Lincoln 1985) Dialogic/dialectical Knowledge of the world is intentionally constituted through a person's lived experience (Weber 2004). Meaning is based on our interactions with our environment (Guba and Lincoln 1985; Lincoln et al. 2011) Research findings are the creation of the process of interaction between the inquirer and the inquired into (Guba 1990; Lincoln et al. 2011). (**44**)	The drivers of research are the study of social structures, freedom and oppression as well as control and power. The knowledge we produce can change existing structures and get rid of oppression through emancipation (Merriam 1991; Cox and Sinclair 1996; Lincoln et al. 2011). (**65**)	Critical subjectivity exists and is dependent on the transaction with reality. There is an extended epistemology consisting of experiential, propositional as well as practical means of knowing. These facets co-constitute research findings (Heron and Reason 1997; Guba and Lincoln 2005; Lincoln et al. 2011). (**86**)
Research objects (What is the relationship between the researcher and the objects?)	The research object has inherent qualities that exist independently of the researcher (Weber 2004). (**3**)	Minimum interaction with the research objects. Distance between researcher and object to get objectivity (Guba and Lincoln 2005; Lincoln et al. 2011). (**24**)	The research object is interpreted in light of meaning structured by the researcher's lived experience (Weber 2004) Through its research methods there is adequate dialog between the research subjects and objects to	Research objects such as structures, freedom and oppression and control and power informs the researcher's research agenda (Merriam 1991; Cox and Sinclair 1996; Lincoln et al. 2011). There is a separation but	There is a participatory transaction between the researcher and the object (Guba and Lincoln 2005; Lincoln et al. 2011). (**87**)

(continued)

Table 4.1 (continued)

Knowledge generation					
Metatheoretical assumptions about	Positivism	Postpositivism	Interpretivism/constructivism	Critical theories	Participatory
			collaboratively construct a meaningful reality (Angen 2000). (**45**)	only as far as the researcher is physically separated from the object. Other than that, the researcher could be imbedded in the research object. (**66**)	
Method (What is the process of research?) (Creswell 2007; Lincoln et al. 2011)	Statistics, content analysis, laboratory experiments, field experiments and surveys (empirical data gathering and analysed through statistical analyses) (Weber 2004) The scientific method is king and a belief in the falsification principle (results and findings are true until disproved) (Merriam 1991; Lincoln et al. 2011). Researchers use maps, photographs and sketches to indicate one identifiable and objective reality, an	Statistics, content analysis, laboratory experiments, field experiments and surveys (empirical data gathering and analysed through statistical analyses) (Weber 2004) Statistics are important to visually interpret findings Hypothetical deductive method is used (hypothesis, deduce and generalise). Scientific method is king. Because of the unknown variables postpositivists asks more questions than positivists	Hermeneutics, phenomenographic studies, case studies, ethnographic studies and ethnomethodological studies (Weber 2004) Interpretive approaches rely on interviewing, observation and analysis of existing texts (Angen 2000). Researchers use maps, photographs and sketches to indicate an interpreted and constructed reality. Researchers also use these to interpret reality according to the researcher's lived experience with maps, photographs and sketches as representations of the	Dialogic/dialectical (Guba and Lincoln 2005) Researchers actively search for participatory research to empower the oppressed and support social transformation and revolution (Merriam 1991; Lincoln et al. 2011). Researchers use maps, photographs and sketches as representations of inequality and injustice. (**67**)	Deconstructing, face-to-face learning, and democratic dialogue (Heron and Reason 1997) Collaborative action inquiry emphasises the practical, using language that is grounded in shared experiential context (Guba and Lincoln 2005). Maps, photographs and sketches are shared as experiences. (**88**)

(continued)

Table 4.1 (continued)

Knowledge generation					
Metatheoretical assumptions about	Positivism	Postpositivism	Interpretivism/constructivism	Critical theories	Participatory
	independent reality and a correspondence theory of truth. (**4**)	(Merriam 1991; Guba and Lincoln 2005; Lincoln et al. 2011). Researchers use maps, photographs and sketches to indicate one identifiable and objective reality, an independent reality and a correspondence theory of truth. (**25**)	interaction the researcher has had with his/her environment. (**46**)		
Theory of truth	Correspondence theory of truth: one-to-one mapping between research statements and reality (Weber 2004) Only one truth or reality (Lincoln et al. 2011). (**5**)	One truth but will never be fully understood and the researcher is in control of the process of inquiry process that produces the truth (Lincoln et al. 2011). (**26**)	Truth as intentional fulfilment: interpretations of research object match lived experience of object (Weber 2004) There are no permanent standards to know truth in a universal manner (Lincoln et al. 2011). (**47**)	Truth is found in the struggle for equality and social justice. Social science indicates the oppression of people (Lincoln et al. 2011). (**68**)	Knowledge is based on the transformation and experience gained through shared research inquiry between researchers and subject (Lincoln et al. 2011). (**89**)
Validity	Certainty: data truly measures reality (Weber 2004) Data can be proven (Lincoln et al. 2011). (**6**)	The validity of research comes from peers and not the subjects that we study (Guba and Lincoln 2005; Lincoln et al. 2011). (**27**)	Defensible knowledge claims (Weber 2004) depending on the methods used (Lincoln et al. 2011) Extended constructions of validity through consensus, which is based on participants and inquirer (Guba and Lincoln 2005; Lincoln et al. 2011). (**48**)	Validity comes about when research creates action (action research) or participatory research that creates positive social change (Guba and Lincoln 2005; Merriam 1991; Lincoln et al. 2011). (**69**)	Validity is located in the ability of the knowledge to become transformative according to the findings of the experiences of the subject. Extended validity constructions (Guba and Lincoln 2005; Lincoln et al. 2011). (**90**)

(continued)

Table 4.1 (continued)

Knowledge generation					
Metatheoretical assumptions about	Positivism	Postpositivism	Interpretivism/constructivism	Critical theories	Participatory
Reliability	Replicability: research results can be reproduced (Weber 2004). (**7**)	Statistical confidence level and objectivity in data produced through inquiry (Lincoln et al. 2011). (**28**)	Interpretive awareness: researchers recognize and address implications of their subjectivity (Weber 2004). (**49**)	The value of the inquiry is located in the subversion of privileges and its ability to impart action for the creation of a more fair society (Giroux 1982; Guba and Lincoln 2005; Lincoln et al. 2011). (**70**)	Correspondence between experiential, presentational and practical knowing. This leads to action for the transformation of the world in the service of human well-being (Guba and Lincoln 2005; Lincoln et al. 2011). (**91**)
Training	Training is technical and quantitative. Prescribe the scientific method (Guba and Lincoln 2005; Lincoln et al. 2011). In the social sciences the training has a bias towards the scientific method. (**8**)	Training is technical and quantitative. Researchers have the ability to conduct mixed-method research (Guba and Lincoln 2005; Lincoln et al. 2011). (**29**)	Researchers are resocialised, can do quantitative and qualitative research, study history, values of altruism, emancipation and empowerment (Guba and Lincoln 2005; Lincoln et al. 2011). (**50**)	Training is qualitative and quantitative methods. Researchers study history and social science to understand the nature of emancipation and empowerment (Guba and Lincoln 2005; Lincoln et al. 2011). (**71**)	The co-researchers are initiated into the research/inquiry process by the researcher or facilitator. The co-researchers learn through active participation. To do this the researcher or facilitator must have emotional competence, a democratic personality and skills (Guba and Lincoln 2005; Lincoln et al. 2011). (**92**)
Total					
Grand total					

(continued)

Table 4.1 (continued)

Agency					
Theoretical assumptions about	Positivism	Postpositivism	Interpretivism	Critical theories	Participatory
Organising question	Who governs and who benefits? (Hobson and Seabrooke 2007). (**9**)	Who governs and who benefits? (**30**)	Who acts and what are the consequences of their actions (i.e. how are their actions enabling change)? (Hobson and Seabrooke 2007). (**51**)	Who acts to bring about a just, fair and equal society? (**72**)	Who is in dialogue to bring about change for the betterment of the human condition? (**93**)
Unit of analysis	Hegemons/great powers, international regimes, ideational entrepreneurs, capitalist world economy, structures of rule (Hobson and Seabrooke 2007). (**10**)	Hegemons/great powers, international regimes, ideational entrepreneurs, capitalist world economy, structures of rule (Hobson and Seabrooke 2007). (**31**)	Everyday actors interacting with elites and structures. (**52**)	Everyday actors and the epistemic community interacting with one another and subverting structures of injustice and discrimination. (**73**)	Researchers and the elite and practitioners from different economic spheres through dialogue to better the human condition. (**94**)
Prime empirical focus	The supply of order and welfare maximisation by elites as well as the maintenance of the powerful and the unequal distribution of benefits (Hobson and Seabrooke 2007). (**11**)	The supply of order and welfare maximisation by elites as well as the maintenance of the powerful and the unequal distribution of benefits (Hobson and Seabrooke 2007). (**32**)	The social transformative and regulatory processes enacted, or informed, by everyday actions of individuals (Hobson and Seabrooke 2007). (**53**)	Social transformations that will bring about justice, equality, non-discrimination and revolution. (**74**)	The supply of order and welfare maximisation by elites (Hobson and Seabrooke 2007), researchers and practitioners from different spheres of society. (**95**)
Locus of agency	Top-down (Hobson and Seabrooke 2007). (**12**)	Top-down (**33**)	Bottom-up (Hobson and Seabrooke 2007). (**54**)	Bottom-up (**75**)	Horizontal (**96**)

(continued)

Table 4.1 (continued)

Agency					
Theoretical assumptions about	Positivism	Postpositivism	Interpretivism	Critical theories	Participatory
Level of analysis	Systemic (Hobson and Seabrooke 2007). (**13**)	Systemic (**34**)	Complex/holistic (Hobson and Seabrooke 2007). (**55**)	Complex/holistic (**76**)	Complex, holistic and systemic. (**97**)
Ontology	Structuralist (Hobson and Seabrooke 2007). (**14**)	Structuralist (**35**)	Agential or structurationist (Hobson and Seabrooke 2007). (**56**)	Agential or structurationist (**77**)	Agential, structurationist and structuralist. (**98**)
Recommendations based on specific theoretical assumptions	Positivist, positivist or interpretivist (Hobson and Seabrooke 2007). (**15**)	Positivist, postpositivist and interpretivist. (**36**)	Interpretivist, postpositivist, subjectivist and positivist (Hobson and Seabrooke 2007). (**57**)	Subjectivist and interpretivist (**78**)	Interpretivist, subjectivist, postpositivist and positivist. (**99**)
Voice	Decision-makers, policy-makers and change agents are informed by a 'disinterested scientist' (Lincoln et al. 2011). (**16**)	Decision-makers, policy-makers and change agents are informed by a 'disinterested scientist' (Lincoln et al. 2011). (**37**)	The advocate and activist is a 'transformative intellectual' (Lincoln et al. 2011). (**58**)	The advocate and activist is a 'transformative intellectual' (Lincoln et al. 2011). (**79**)	The researcher *and* practitioners. (**100**)
Ethics	The research studies nature and not to influence how nature affects populations (Guba and Lincoln 2005; Lincoln et al. 2011). (**17**)	The effect on others is not taken into consideration because the research is conducted to gain accuracy, not influence populations (Lincoln et al. 2011). (**38**)	The research process is geared towards the revealing special problems (Guba and Lincoln 2005; Lincoln et al. 2011). (**59**)	Research is linked to specific interests in the development of a just society (Giroux 1982; Lincoln et al. 2011). (**80**)	The research process is geared towards the revealing special problems (Guba and Lincoln 2005; Lincoln et al. 2011). (**101**)

(continued)

Table 4.1 (continued)

Agency					
Theoretical assumptions about	Positivism	Postpositivism	Interpretivism	Critical theories	Participatory
Hegemony or the influence a researcher has over others (Lincoln et al. 2011)	Positivists believe that research should be influential and not the researcher or scientists. The aim is to produce the truth and not to provide actions for the reality to affect others in society (Lincoln et al. 2011). (**18**)	Data, from which decisions can be made, will be produced through statistical analysis of reality. The researcher is in control of the process of inquiry (Guba and Lincoln 2005; Lincoln et al. 2011). (**39**)	Researchers seek input into practices and recognition. They also offer to change existing paradigms (Guba and Lincoln 2005; Lincoln et al. 2011). (**60**)	The research endeavours indicate how interactions of privilege and oppression as they stand in relation to race, ethnicity, gender, class, sexual orientation, physical or mental ability and age (Kilgore 2001). (**81**)	Power is a variable in what and how we know (Kilgore 2001; Lincoln et al. 2011). (**102**)
Axiology or how researchers act based on their research. This also implies the criteria of values and value judgements especially in ethics (Lincoln et al. 2011)	There should be distance between the researcher and the subject so that researchers' actions do not influence populations. This is the job for the laws researchers produce (Guba and Lincoln 2005; Lincoln et al. 2011). (**19**)	Researchers should as far as possible get a better understanding of reality and as close as possible to the truth. This must be done through the use of statistics that explains and describes what is known as reality (Guba and Lincoln 2005; Lincoln et al. 2011). (**40**)	Propositional and transactional knowledge is instrumentally valuable to achieve social emancipation (Guba and Lincoln 2005; Lincoln et al. 2011). (**61**)	Researchers seek to change issues and social institutions' practices and policies (Bernal 2002; Lincoln et al. 2011). (**82**)	Researchers use their practical knowing to flourish with a balance of autonomy, cooperation and hierarchy as an end in itself is valuable (Heron and Reason 1997; Lincoln et al. 2011). (**103**)
Action (What is produced because of the research beyond the data? How does society	Researchers must remain strictly objective. They are not concerned with the actions produced	Researchers must remain strictly objective. They are not concerned with the actions produced	The research can mandate training in political action should the participants do not	The research must produce social change, change in human thinking and be an	The research can mandate training in political action should the participants do not

(continued)

Table 4.1 (continued)

Agency					
Theoretical assumptions about	Positivism	Postpositivism	Interpretivism	Critical theories	Participatory
use the knowledge generated?) (Lincoln et al. 2011)	because of their research (Guba and Lincoln 2005; Lincoln et al. 2011). (**20**)	because of their research (Guba and Lincoln 2005; Lincoln et al. 2011). (**41**)	understand political processes and systems. If the research does not have an education purpose then it has to compel people to act politically (Guba and Lincoln 2005; Lincoln et al. 2011). (**62**)	examiner of human existence (Creswell 2007; Lincoln et al. 2011). (**83**)	understand political processes and systems (Guba and Lincoln 2005; Lincoln et al. 2011). (**104**)
Control (Who dictates how the research is produced and used?) (Lincoln et al. 2011)	The researchers conduct control without any inputs coming from participants or society (Guba and Lincoln 2005; Lincoln et al. 2011). (**21**)	The researchers conduct control without any inputs coming from participants or society (Guba and Lincoln 2005; Lincoln et al. 2011). (**42**)	The research is shared between the researcher and participants. Without equal or co-equal control the research would be impossible (Guba and Lincoln 2005; Lincoln et al. 2011). (**63**)	Control can be shared by the researcher and the subjects. The subject can have a say in how the research is conducted (Bernal 2002; Lincoln et al. 2011). (**84**)	The research is shared between the researcher and participants. Without equal or co-equal control the research would be impossible. Knowledge is an expression of power (Kilgore 2001; Lincoln et al. 2011). (**105**)
Total					
Grand total					

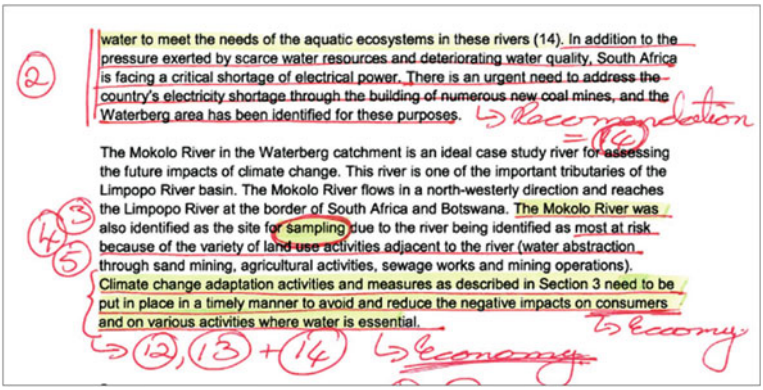

Fig. 4.1 An example of 'marking' of a text using the *red* numbering system in the research paradigm assessment index. The numbers in the *red circles* corresponds with those in the research paradigm assessment index to indicate the presence (or absence) of the metatheoretical assumption

brackets is there to aid in the analysis of policies, programmes or plans. For instance, should the metatheoretical assumption be present in the text, the analyser will mark with the appropriate red number to indicate its presence (see Fig. 4.1 for an example of a piece of text marked in this manner).

What is the motivation for such an assessment index? Empirical research is based on conceptual inquiry with the latter being a 'prerequisite' to conduct such research (Wight 2006; Kurki 2008; Kurki and Wight 2013). What this means is that it is necessary to have an adequate understanding of the concepts we use, why we use certain concepts over others and recognising the strengths and weaknesses of concepts. Without such an understanding, the research we conduct will not be adequately justified and could boil down to nothing but mere 'fact-finding'. It also means that we will not appreciate the differences of how and why other researchers engage in research and use the same concepts, which could have a negative impact on constructive debate with those having a different perspective (Kurki 2008: 9). Be that as it may, and here lies the crux of the research paradigm assessment index, '… whenever we make factual, explanatory or normative judgements about…' the world around us '…important meta-theoretical filters [in the form of the meta-theoretical assumptions] are at work in directing the ways in which we talk about the world around us, and these filters are theoretically, linguistically, methodologically, and also potentially politically consequential' (Kurki 2008: 9). Theorising in the South African water discourse was at the turn of the current century implicit or subliminal (Du Plessis 2000). Theorising is currently more visible, deliberate and potentially political. Theory, and meta-theory in particular, is playing an influential role in the way scientists see and theorise the world (Kurki and Wight 2013). Complexity and adaptive management come to mind as such theories. As already mentioned, positivism is the dominant paradigm in the three

analysed case studies. This is not to say that scientists with a positivist background are wrong. The problematique lies therein that a predominantly positivist epistemology can have dire consequences not only for the natural environment but also for the societies it sustains. The time and energy spent on a positivist agenda, or any other research paradigm, could detract researchers from problems lurking in the shadows impeding understanding and innovation (Lake 2011). Arguing from a certain paradigm '…create intellectual blinders and institutional barriers' (Sil and Katzenstein 2011: 481), which is one of the reasons why academics are side-lined when it comes to practical problems in the real world (Nye 2009; Sil and Katzenstein 2011; Lake 2013). Intellectual blindspots could have a spill-over effect in policy formulation and implementation. The research paradigm assessment tool can assist in identifying potential red flags early on. The assessment tool assists decision makers and is not the be-all end-all in predicting and identifying policy problems. The research paradigm assessment index will identify where current research is focusing attention and where the potential pitfalls for practicalities lie. According to Kurki (2006: 213) …metatheoretical framings of explanatory frameworks have direct effects on the kinds of explanations we advance for concrete world political processes: indeed, theoretical and conceptual lenses "constrain and enable" … the kinds of explanations we can construct.' As such, and by investigating which research paradigm is dominant, could enable us to generate more holistic and open explanations (Kurki 2006) to practitioners on the challenges facing water resources. That said, the meta-theoretical assumptions utilised to assess the paradigmatic stance of a project, policy or programme are important; they not only show us how researchers and practitioners think about issues in the water sector, but also how they help to construct the way we deal with problems or create opportunities.

4.3.2 Component #2: The Ethos of Analytic Eclecticism

If positivism, or any other research paradigm for that matter, has blind spots what is the proposed alternative? The answer lies in analytic eclecticism—a need to go beyond paradigms (Sil and Katzenstein 2010; Meissner 2016). According to Sil (2009), Friedrichs (2009), Friedrichs and Kratochwil (2009) and Cornut (2014), analytic eclecticism is a pragmatist alternative to scholarship that is grounded in current research traditions or paradigms. In other words, analytic eclecticism is a pragmatic methodology to the traditional scholarly knowledge that is the stuff of existing and dominant research paradigms such as positivism, postpositivism and interpretivism/constructivism (Sil 2009; Franke and Weber 2011; Cornut 2014). Analytic eclecticism is problem-driven since it includes the extraction, adaptation, and integration (not synthesis) of hidden concepts, mechanisms, logical principles, as well as interpretive actions embedded in research traditions. Research paradigms or traditions are identified with separate styles of research and reflecting dissimilar combinations of ontological and epistemological principles. Other characteristics of

analytic eclecticism include the extraction and integration of factors, causal narratives, assumptions and 'interpretive moves' embedded in embedded paradigms and theories (Sil 2009). As already seen in the research paradigms assessment index, each research paradigm has its unique 'research style' reflecting particular and distinctive 'combinations of ontological and epistemological principles' (Sil 2009: 649). This is also the case with the numerous social theories, as I have already explained when discussing the distinction between research paradigms and theories and their utility.

Analytic eclecticism's purpose is to avoid paradigmatic limitation. Such confinement can lead to a disconnection between the researcher and his or her offering to practitioners. Sil and Katzenstein (2010) argue that a particular paradigm can become an obstacle of understanding even if it gives powerful insights. The argumentation goes as follows. Prior assumptions are the foundations of research. Research questions are developed and boundaries for investigation set. Research is conducted to reflect these prior assumptions. Paradigmatic progression is then coached in ever increasing sophistication as arguments progress within a specific bounded research tradition. Explaining the complexities of problems become the victims. Analytic eclecticism does not discard established research paradigms or traditions. Instead, analytic eclecticism discovers applicable relationships between research paradigms. After wich analytic eclecticism reveals the invisible connections of the perceived mismatched paradigm-bound theoretical elements. The purpose of this is to produce novel insights influencing policy debates and practical problems. To do this, requires alternative thinking about the relationships among assumptions, concepts, theories, research paradigms and problems (Sil and Katzenstein 2010). To better understand the complexities of real world problems, it is necessary to step outside theoretical and paradigmatic boundaries and engage such problems from a multiple theoretical perspective in order to assist practitioners. This is the ethos of PULSE[3].

One argument to discount analytic eclecticism is to say that complexity theory is all we need to address problems occurring in the water sector. The argument states that complexity theory is an all-encompassing theory that explains all or at least many aspects found in nature and society. Such an argument is bound to run into trouble. Complexity thinking is considered superior for explaining and solving problems. Putting complexity theory forward as superior to other theories runs the risk of a high degree of error (Sil and Katzenstein 2010). Complexity would be limited in scope for it would be only *one* analytic perspective. A researcher, arguing from a complexity stance could 'miss' other perspectives because of the perception that complexity is all encompassing in explaining issues and phenomenon. Complexity might be useful in explaining many elements at work in social-ecological systems. Yet, it has little to offer decision makers interested in bringing about change in society (Hoffmann 2003) since it does not rest on a critical theory ontology, for instance. Said differently, complexity theory is not a critical theory with an emancipating agenda. The theory is not a reliable blueprint and can desensitise us to the possibility that a specific theory could be wrong (Hirschman 1970; Tetlock 2005 in Sil and Katzenstein 2010).

Similarly to the complexity argument outlined above, transdisciplinarity could also be advanced as an alternative to analytic eclecticism. Analytic eclecticism and transdisciplinarity is not the same. Transdisciplinarity deals with the breaking down of disciplinary silos in and between the natural and social sciences. There is a recognition that transdisciplinarity should be the way to do research at a number of scales. It is also needed at a functional level where the relationship between ecosystems and society need better understanding. A link between transdisciplinarity and complexity exists. Transdisciplinarity 'facilitates a deeper understanding of complexity and complex problems by examining different facets of reality through the lens of multiple perceptions' (Jacobs and Nienaber 2011: 670). Transdisciplinarity operates at the intersection between agents and structures and is situated at the nexus between problem solving and values, ethics, norms, cultures and beliefs (Sil 2000; Lawrence and Depres 2004; Max-Neef 2005; Jacobs and Nienaber 2011). Transdisciplinarity also deals to some extent with epistemological questions on how to generate knowledge. Complexity and transdisciplinarity operate on a plain where the methodological meets the theoretical (Max-Neef 2005), but not the meta-theoretical elements of research paradigms.

As such, transdisciplinarity is a foundation of analytic eclecticism, which operates on the meta-theoretical level where questions of knowledge generation and agency are addressed. Research paradigms are not divided by practical claims about phenomena. The fault line is on their metatheoretical assumptions on 'how such claims should be developed and supported' (Sil and Katzenstein 2010: 4). Complexity and transdisciplinarity are silent on the meta-theoretical aspects of metatheoretical assumptions. Analytic eclecticism makes it possible for teams to work together as well as affording the researcher the opportunity to work solo in multiple research traditions or research paradigms even if these are incompatible (Laudan 1977 in Sil and Katzenstein 2010). Linking analytic eclecticism with the use of transdisciplinarity, researchers can be transdisciplinary without being eclectic, but can be eclectic when using transdisciplinarity. This means that with eclecticism you can integrate research paradigms across different disciplines simultaneously. Yet, you cannot practice eclecticism with only transdisciplinarity as a tool in hand.

Analytic eclecticism is, furthermore, not theoretical synthesis (Sil 2009; Friedrichs and Kratochwil 2009). For Sil and Katzenstein (2010: 17): '…analytic eclecticism [is] a flexible approach that needs to be tailored to a given problem and to existing debates over aspects of this problem. As such, it categorically rejects the idea of a unified synthesis that can provide a common theoretical foundation for various sorts of problems.' Said differently, it is not one theoretical approach to tackle all sorts of problems, but more a case of diverse convergence of theoretical elements for diverse problems (Sil 2009; Sil and Katzenstein 2010). That said, analytic eclecticism resists an elegant theory with a small number of assumptions that explains a wide range of phenomena and the development of panaceas for a range of problems.

Complexity, transdisciplinarity and theoretical synthesis are put forward from a positivist agenda in the South African water discourse (e.g. Pollard and Du Toit 2008; Pollard et al. 2014; Jacobs and Nienaber 2011). Complexity asks for a better appraisal of societal and ecological challenges. Transdisciplinarity propagates the breakdown of scientific silos. Theoretical synthesis is promoted to assist with challenges occurring in the natural environment from a positivist point of view. The snag is they do not transgress the divide between positivism, postpositivism, interpretivism/constructivism, critical theories and the participatory paradigm, especially not at a metatheoretical level.

What are analytic eclecticism's characteristics? It rests on three pillars. The first is open-ended problem formulation taking into account the complexity of phenomena and issues. It is not intended to advance or fill gaps in paradigm-bound research. Secondly, it is a middle-range causal account integrating complex interactions among multiple mechanisms and logics drawn from more than one research paradigm. This causal account relates to analytic eclecticism's middle position along the agent-structure axis, on the one hand, and the material-ideational axis on the other. Thirdly, the findings and arguments connect scholarly debates and real world dilemmas of decision makers. Analytic eclecticism engages both academic and practical concerns (Sil and Katzenstein 2010; Hayes and James 2014). Let's unpack this further to debunk arguments that analytic eclecticism is the same or similar to complexity theory, transdisciplinarity and theoretical synthesis.

Problem formulation from a particular research paradigm rests on cognitive structures. These constructions are concepts, metatheoretical assumptions and analytical principles, among others. With these we make observations of complex social and biophysical phenomena. Simplification is unavoidable and a part of reality. Simplification can serve as a sample of the wider scheme of things under investigation. How and to what extent we simplify in problem formulations influences our understanding of matters and issues. Should problems being stated as different objects of already existing theoretical assumptions, they will seem inappropriate and misleading to everyone except those adhering to the researcher's assumptions (Shapiro 2005 in Sil and Katzenstein 2010). Problems formulated in this way can create blindspots for practitioners. Decision makers are unlikely to consider alternatives on different plains and across paradigmatic borders. It is problematic to coach societal and biophysical phenomena within a specific paradigm or theory. Analytic eclecticism goes beyond such boundaries to smooth the progress for open-ended analysis that is able to join the insights from different theories and communicate them to decision-makers (Sil and Katzenstein 2010) in an effective manner.

What is the promise of analytic eclecticism? It does not slice up complex social phenomena just for making them simple and easy to analyse. In other words, reductionism is not an underlying premise and analytic eclecticism can help us move away from causal and theoretical reductionism to a more holistic understanding of processes in the real world (Kurki 2006). Important substantive questions with relevant real world application are in the offing by integrating empirical observations and causal stories, in other words, by incorporating the five research

paradigms. This brings about the 'promise of richer explanations' (Sil and Katzenstein 2010: 3) and deeper understandings. For instance, material resources, like infrastructure and money, matter and are an important ingredient in social relations. Even so, material resources come about through social processes and these involve societal actors and principles that socialise these actors. Formal causes have a different influence in different causal contexts (Kurki 2006). Said differently, analytic eclecticism facilitates the quantum leap from singular explanations of real world problems to fuller clarification, alternatives and solutions to such problems. Where research paradigms have blind spots they have, at the same time, useful insights into issues, challenges and opportunities. There are therefore connections and complementarities between research paradigms to exploit. This could lead to a situation where more useful theoretical and empirical insights are generated (Sil and Katzenstein 2010) to service the practitioner in a meaningful manner.

To reiterate and give a more nuanced explanation of analytic eclecticism's influence on blindspots, Sil (2009: 650–651) argues that studies following analytic eclecticism:

> …share a commitment to identify previously hidden or under-appreciated connections among a wider range of mechanisms than is typically considered within the boundaries of any one research tradition. One can certainly debate the accuracy or sophistication of specific interpretations or causal explanations offered in…eclectic studies. However … eclectic styles…are necessary to the more regimented styles of research prescribed by competing research traditions. At a minimum, such studies serve the purpose of opening up new avenues for productive dialogue by establishing empirical connections between theoretical vocabularies that are normally seen as incommensurable. Beyond that, they have the potential to uncover social processes and causal forces that might otherwise remain hidden from view.

It is the uncovering of hidden social processes and causal factors that helps drive water governance and water political processes. Analytic eclecticism might assist in neutralising active substantiation to a certain extent. As already mentioned, the confirmation bias is a tendency to look for and interpret information in a way that it is consistent with existing beliefs or expectations (Marks and Fraley 2006). These beliefs and expectations relate to social stereotypes, attitudes and self-serving conclusions (Frey 1981; Holton and Pyszczynski 1989; Johnston 1996; Lundgren and Prislin 1998; Jonas et al. 2001). Active substantiation applies across a range of social settings, issues, situations, processes and relationships from the confirmation of scientific research to causes of aircraft accidents (ASC 2002; Wise in Robertson 2012). An example will clarify its impact on politics. In March 2003 the United States of America and Great Britain invaded Iraq on the pretext that the latter possessed biological and chemical weapons of mass destruction. The invading countries also claimed that Iraq had links with the Al-Qaeda terrorist group responsible for the attacks on the World Trade Centre and Pentagon in September 2001. Later it was revealed that Iraq had no weapons of mass destruction and did not have links with Al-Qaeda (Lebow 2008). The intelligence on the weapons of mass destruction was based on suspect intelligence and even considered as 'wishful

thinking and lies'. Iraqi defectors to the West had told European intelligence agencies that the Iraqi government was developing biological and chemical weapons. This was not the case (Rudin 2013). Active substantiation has an effect on the way we make decisions. After a decision had been reached people prefer the information supporting the decision over that of the information discounting it (Jonas et al. 2001). I am convinced that active substantiation is rife in the South African water discourse. I would go so far as to say that this is also the case in the international water discourse. As already mentioned, scientists depend on singular theoretical perspectives, such as complexity thinking, hydro-hegemony and adaptive management as well as certain beliefs to further their arguments and support their recommendations (e.g. CDE 2010). Analytic eclecticism can, under certain circumstances, have a positive impact in reducing the occurrence of active substantiation. It does so by presenting alternative information sources based on a different research paradigmatic and theoretical perspective to decision-makers. Circumstances conducive to analytic eclecticism's effect on active substantiation include a culture where analytic eclecticism is practiced purposefully. For analytic eclecticism to have the desired effect, active substantiation needs to be recognised as a potential obstacle to effective decision making.

Through analytic eclecticism it is possible to come up with narratives or theories that have a practical impact on social and biophysical conditions resting on prevailing ideas. Analytic eclecticism, either implicitly or explicitly, bring forth useful insights. These insights need to add value to policy debates and normative discussion that go beyond scholarly work. Its purpose is not to create new arguments for the sake of argumentation and shows that it is possible to confront problems from a variety of research paradigms and theories (Cornut 2014). Analytic eclecticism's purpose is not to come up with a new line of analysis that goes beyond classification within an existing research paradigm. Analytic eclecticism looks into how paradigm-bound research generates insights to develop causal stories that capture the complexity, contingency and messiness of environments in which actors solve problems and generate opportunities through implicit recommendations. Analytic eclecticism must have 'some clear implications for some set of policy debates or salient normative concerns that enmesh leaders, public intellectuals, and other actors in a given political setting' (Sil and Katzenstein 2010: 22). To reiterate, analytic eclecticism is about the integration of different paradigms and theories that are appropriate to the issue at hand. It is to produce a more thorough investigation of phenomenon or issue (Teddlie and Tashakkori 2011). Because of the development of more detailed inquiries, an assessment of the prevailing research paradigm within a problem area is needed. Based on this appraisal one can move forward in a meaningful manner and apply analytic eclecticism where it matters not only to indicate what is being missed, but also to become a foundation for various theoretical elements to illuminate issues and perspectives.

4.3.3 Component #3: Theories for Practice

For analytic eclecticism to progress in a meaningful manner one needs a repertoire of theories (see Table 4.2 and Appendix 2) because eclectic studies utilise various theories to analyse problems of importance (Cornut 2014). As already stated, not one single theory can explain everything or an event (Aron 1967; Albert and Buzan 2013; Mearsheimer and Walt 2013), complexity included. Alternative approaches and traditions are needed to construct a collective understanding of events (Hayes and James 2014). The late Ostrom (2007: 15181) propagated the '…serious study of complex, multivariable, nonlinear, cross-scale, and changing systems,' instead of relying on '…simple, predictive models of social-ecological systems…and deduce universal solutions, panaceas, to problems of overuse or destruction of resources.' To take up Ostrom's (2007) call, a plurality of theories, and not just a few or at best one theory, is needed to construct a collective understanding. Below is a list of interpretivist, critical, postpositivist and positivist theories applicable to the practicalities of the governance and politics of society and the natural environment. The theories should be seen not only as explanations of events, but also as practitioners' modes of thinking (Hayes and James 2014). This list of theories is by no means exhaustive because it identifies the theories that I have come across during my research career. Ideally, one should be able to expand on it and refine it on a constant basis. It must therefore be dynamic. What's more, practitioners do not adhere to one theory in executing practices or policies. In this regard, theories 'describe modes of thinking and not so much objective patterns of behaviour' (Hayes and James 2014: 408). A plurality of theories is also needed because practitioners are likely to move from one mode of thinking to another, and thereby rely on a variety of theories. This will inevitably generate contradictions when analysed (Hayes and James 2014).

Here I would like to discuss and defend the repertoire of theories, and not just this particular repertoire, but more the pluralist philosophy behind it. In my opinion, and I agree with Lebow (2011: 1225–1226 cited in Rengger 2015) that: 'Pluralism must be valued as an end in its own right but also as an effective means of

Table 4.2 The repertoire of theories

Agential power	Interactive governance theory (Governability)	Normative commensalism
Ambiguity theory of leadership	Interest group corporatism	Political ecology or Green politics
Complexity theory	Interest group pluralism	Risk society
Cultural theory of International Relations	Marxism	Social constructivism
Everyday international political economy	Modernity	Strategic adaptive management or adaptive management
Feminisms	Neo-liberalism (Liberal pluralism)	Theory of social learning and policy paradigms
Hydro-social contract theory	Neo-realism (Realism)	

See Appendix 2 for a detailed rendition of these theories and their assumptions

encouraging dialogue across approaches, something from which we have something to learn.' This means that the pluralistic use of theories bring about a variety of explanatory forms (Rengger 2015) of what is happening in the social world. This claim is also in line with the ethos of analytic eclecticism. Looking closely at Lebow's (2011) claim of pluralism in scholarship and theory, what is this 'something' we all can learn? I am of the view that this 'something' goes beyond the fact that there is a plurality of theories that explain social phenomenon. For me this 'something' is the inherent value that each theory contain to widen our knowledge horizons and not to restrict us to mono-paradigmatic and mono-theoretical explanations of reality. Put in another way, we will gain, as far as I am concerned, more knowledge to explain and deepen our understanding of issues and open the dialogue between disciplines and fields of study in the water discourse, something we can then utilise in the service of assisting practitioners and concerned citizens. This service of scientists is for me the ultimate 'something' we will learn because it will take us further away from our mono-theoretical convictions and the blind following of the so-called sages or gurus that put forward theories for others to follow willy-nilly without questioning their basic assumptions. The dialogue Lebow (2011) refers to can take many forms, not just the 'genuine and reasoned communication between equals' (Rengger 2015: 3). So, if the dialogue can take many forms, I would like to start my own by continuing my support of paradigmatic and, particularly, theoretical pluralism as opposed to empiricism and the blind following of sages; both of which are easily followed in the water discourse. Here I would like to make a qualification in that empiricism has a role to play in water research especially when investigating the biophysical qualities of water such as its quality expressed in pH, conductivity and turbidity and the impact of low quality water on human and ecosystem health. Yet, when it comes to the social aspects of water resources, empiricism has severe limitations in explaining adequately what is going on. Mearsheimer and Walt (2013) go so far as to say that simplistic hypothesis testing is bad for it emphasises the discovery of empirical regularities.' For them, emphasising simplistic hypothesis testing over theory creation, testing and theory utilisation 'is a mistake' (Mearsheimer and Walt 2013: 427). The reasoning they put forward is that '…insufficient attention to theory leads to misspecified models or misleading measures of concepts.' As a consequence, simplistic hypothesis testing over theory creation, testing and utilisation is widening the chasm between the scholarship ivory tower and the real world. This could make the social sciences less relevant to practitioners and citizens (Mearsheimer and Walt 2013). A situation like the one put forward by Mearsheimer and Walt (2013), does not bode well for the dialogue mentioned earlier and the service social science is supposed to render to practitioners and society.

In support of my repertoire of theories, it is necessary that scholars have to have a good and solid grasp of theory and, just as important, use theories to guide research (Mearsheimer and Walt 2013) and influence policy debates. Regarding my repertoire of theories, Mearsheimer and Walt (2013: 430) argue that: '…many kinds of theory…can be useful for helping us understand how [society] works. In our view, a diverse theoretical ecosystem is preferable to an intellectual monoculture.'

They go further to say that: '…we believe progress in the field depends primarily on developing and using theory in sophisticated ways' (Mearsheimer and Walt 2013: 430).

So, it is not only about the presentation of a repertoire of theories, but also about the utilisation of theories in the water sector that needs to be taken into account by researchers. In my opinion, by using analytic eclecticism will be a good starting point in the sophisticated use of the repertoire of theories. Here I would like to return to a claim made earlier; why is a single theory unable to explain everything? Since theories zoom in on the most important factors, so to speak, and discard other factors, a discarded factor can have an important influence in another particular case (Mearsheimer and Walt 2013). The purpose of the repertoire of theories is not merely to club together a number of theories, but to identify as many factors as possible that could be omitted from one theory or another.

There is another reason for presenting this repertoire of theories; to prevent PULSE^3 from becoming a panacea. Academics, scientists and practitioners have a tendency to rely on panaceas or cure all's in the explanation and solution of problems. Here Sil and Katzenstein (2010) make a valuable observation: 'Paradigm-bound research provides powerful insights, but in the absence of complementary efforts to compare and integrate insights from multiple paradigms, the latter can become a "hindrance to understanding"'.

By employing these theories to policies, programmes and practices make for 'messy analyses'. What I mean by a 'messy analysis' is that by employing different theories at once to one case study or a set of cases, different interpretations in a context will come to the fore. Such an analysis comes over as unstructured because the jump from one theoretical explanation to another can place high demands on the reader. Even so, this is a price I am willing to pay, because at the end of the day I would not want to 'risk missing the forest for the trees' as Lebow (2007: 4) notes. What is more, to provide better explanations of events in the water sector, single ontological factors (ideas, material concerns, agents and structures) and their influence on processes need to be abandoned. Causal factors are not independent, a tendency that are highlighted in the list of theories. By incorporating more than one theoretical explanation, we are able to ask more open and multi-causal questions. This necessitates a move away from theoretical reductionist explanations. By doing so, scientists will be able to give explanations of the complex interplay between norms and material constraints that are analysed holistically and with a better appreciation of historical causal forces (Kurki 2006). Explanations of this nature should not only be done for the sake of holism and history. The explanations should be geared towards the better explanation of processes and causes of problems, taking holism and their history into account. Such a way of explaining processes could expand our thinking when interpreting the causes of concrete problems and the creation of opportunities to tackle problems.

4.4 Operationalising Analytic Eclecticism and the Repertoire of Theories

I will now outline a number of steps in the utilisation of the ethos of analytic eclecticism and the repertoire of theories. The purpose of which is to determine whether all relevant issues have been addressed when research scientists have investigated an issue in water governance. Related to this, by outlining the method for analysis, research scientists will be able to show the complexity of the issues under investigation that need the input of several sciences so that all the diverse dimensions of research problems are adequately addressed.[1]

According to Cornut (2014: 12), the analytical eclecticism outlined by Sil and Katzenstein is 'rather fuzzy, and it is not easy to understand what epistemological or methodological criteria are used to adjudicate by a jury of peers in an eclectic "court".' The steps I outline below are therefore an important step towards making the ethos of analytic eclecticism and the repertoire of theories more robust as methodological considerations. After identifying the dominant research paradigm, ascertain the theory or theories on which the policy, programme or plan is based. Ask what type of theory or theories are present? A simple classification along the lines of grand and middle range, mathematically orientated (Mearsheimer and Walt 2013), problem solving and critical theories (Cox and Sinclair 1996) will suffice for this purpose. The five theory types will be sufficient for the purposes of this framework, since the field of study I am covering involves both the natural and social sciences. The five theory types can be found in both sciences, with the mathematically orientated theories more at home in the natural sciences than the social sciences. The classification will give an initial indication of the factors, actors and variables the theory is putting forward to explain the issue or phenomenon. Grand theories give explanations of broad patterns of behaviour. In International Relations, these are theories such as realism or liberalism that explain state behaviour in its broadest sense. Middle-range theories, on the other hand, spotlight more narrowly defined issues and phenomena like (Mearsheimer and Walt 2013) management, collective and individual psychology, coercion and so on. Mathematically orientated theories use the language of mathematics as opposed to the other four types that use ordinary language (Mearsheimer and Walt 2013). Examples of mathematically orientated theories include M theory, theories or models that forecast climate change, and the theories of thermodynamics. Problem solving theories explain reality as it is and then suggest ways and means to solve the problems that are encountered during the explanation. These theories have a positivist inclination. Critical theories describe the world, the structures it is made of and then suggests how to change the structures. Critical theories are not positivist or postpositivist but fit the critical theories paradigm (Cox and Sinclair 1996). Using the classification on liberalism, for instance, tells us that neoliberal institutionalism

[1]I would like to thank one of the anonymous reviewers for the ideas contained in this paragraph.

is a grand, problem solving theory that explains inter-state behaviour and proposes solutions to ameliorate armed conflict between states. It also puts forward the construction of structures such as the United Nations to ameliorate the problem of armed conflict among states. A middle-range theory will explain some of the measures that are suggested to solve the problem of war, such as sanctions against the invading country or negotiations between the warring parties. A critical theory would be feminism that explains the issue in terms of gender inequality and how this type of inequality is perpetuated in a conflict situation and then suggests how structures could be changed to bring about more equality between the genders.

The next step in the exercise of using the ethos of analytic eclecticism and the repertoire of theories, is to give a brief summary of the theory's basic assumptions. From this, identify the factors the theory is highlighting. In other words, what is the causal narrative the theory is providing or how the world or reality works? Ask what are the empirical referents and *how* do they operationalise concepts (ideas or principles that are connected to something abstract) in the theory and narrative (Sil 2009; OALD 2013) that are used to think about the policy, programme or plan and its operationalisation? In this context, an 'empirical referent' (Sil 2009) refers to a description of the empirical evidence, knowledge or research (OALD 2013) underscoring the policy, plan or programme. A description is a piece or writing that says what something is like (OALD 2013), in other words, it describes the policy, programme or plan according to specific knowledge claims indicating that something is true even it had not been proved and other people may not believe it (OALD 2013). By doing this, the exercise of accessing the underlying research paradigm becomes clear and the utility of the exercise of the research paradigm assessment falls into place.

Then, isolate the key concepts and/or actors the theory is emphasising. Ask, how does the theory fit independent, interceding and dependent variables together? The answer will tell us how the theory expects the variables to covary. Also ask what is the causal mechanism, producing the expected outcome or outcomes? Causal mechanisms are sometimes unobservable and 'reflect what is actually happening in the real world.' The answer to the last question will give an indication of why a specific hypothesis is true or not (Mearsheimer and Walt 2013: 432).

To put this in another way, it will be necessary to look at causal mechanisms that are defined as entities and structures with the capacity to 'generate observed associations between macrophenomena' (Waldner 2007: 153). As such, causal mechanisms give us an indication that something is happening as well as why or how it is happening. Causal mechanisms provide 'an explanatory account of observed results by describing the mediating process by which the target factor could have produced the effect' (Koslowski et al. 1989: 1317). There are two types of causal mechanisms: etiological and constitutive mechanisms. Etiological mechanisms explain the occurrence of an event while constitutive mechanisms give a causal analysis of phenomena at a small-scale or micro level (Waldner 2007). Causal mechanisms have two functions: they establish explanatory adequacy and they can 'help resolve the problem of theoretical underdetermination by adjudicating rivalries between two or more theories that are consistent with existing

evidence' (Waldner 2007: 146). Said differently, causal mechanisms can either enhance or denunciate hypotheses' credibility even if the hypotheses had been formulated following an impeccable research design. In this way, causal mechanisms provide '…inferential goodness via theory, not via research design; they thus expand our repertoire for making valid inferences' (Waldner 2007: 146). To investigate causal mechanisms it will be necessary to engage with other research paradigms and the repertoire of theories to ascertain which elements may interact in the practitioner's interest.

After this, identify the connections and complementarities across substantive arguments that were developed in the theory or theories put forward (Sil 2009). This links back to the hypotheses inherent in the theory. It is important to also investigate the complementarities. Complementarities, as two or more things that are different but together they form a useful or attractive combination (OALD 2013), will be able to give alternative views of substantive problems when dealing with real, important or serious matters (OALD 2013). In this regard, analytic eclecticism, as mentioned before, confronts the messiness of real world problems (Sil 2009; Sil and Katzenstein 2010).

To operationalise the repertoire of theories further, I will unpack the concept 'messiness.' In my opinion, a 'messy' problem is a situation that is difficult to deal with, which makes it somewhat unpleasant and to an extent confusing (OALD 2013). Because of its perplexing character, the problem is difficult to understand. Understanding the problem is central, and deals with the belief, or more generally, the thinking that something is true, whether based on empirical evidence or someone merely telling us that it is true (OALD 2013). The unpleasantness surrounding the problem brings into play psychological aspects that are often hidden from natural and social scientists researching matters regarding water resource management. It is these psychological aspects that make the problem sometimes more complex for researchers to understand, although they will not readily admit it. At best, researchers will operate as if they are on top of the problem in all its facets and hidden aspects. This level of confidence is, in my view, exaggerated since it is impossible to know everything there is to know about a problem and hence the various theories humans develop.

So, it will be necessary to delve deeper into the messiness aspect that analytic eclecticism mentions. To do this it will be necessary to ask how the theory underlying the policy, programme or plan understands the problem it is trying to confront? Specifically, does this understanding rely on empirical evidence and/or the expressions from so-called sages or gurus? These are important considerations because empirical evidence and the pronouncements of real or perceived gurus are important in understanding the problem that could translate into a specific theory to tackle the problem. Critical engagement of the evidence and the pronouncements will be of critical importance at this stage. There is wise council for all involved in the policy making process from Miller and Spoolman (2012): 'Be sceptical…Do not believe everything you hear and read including the content of this [chapter] without evaluating the information you receive. Seek other sources and opinions.' Sometimes we forget to 'question everything and everybody' as we become

embroiled in our views of reality (theory). This was not lost to Einstein (cited in Uhlenbrook 2006: 3581) when he said that: 'The important thing is not to stop questioning.'

In terms of the problem itself, ask what is unpleasant about the problem. What are potential sources of confusion? Why is the problem difficult to deal with? These probing questions may seem straight forward. Yet, an in-depth look at the problem through these questions will give a deeper understanding of why it is messy and the possible nature and extent of its resolution, as already mentioned. The reason for this is that problems in *all* their complexity are difficult to understand. Said differently, it all boils down to how research scientists understand the problem and its resolution. What is also important is to see how this understanding is communicated to practitioners.

After this, it will be necessary to bring the nature of the empirical evidence into play again. This exercise was completed during the research paradigm assessment. The research paradigm assessment will also assist in the popular pronouncements of the real or perceived sages and how causation is treated when talking about the problem and its solution. Ask if the causation is explained along Humean or Aristotelian/Lebowean lines. To ask questions about the nature of causation, brings into play another aspect of understanding; knowing or realising how or why something happens, how it works or why it is important?

As a pragmatic approach, analytic eclecticism seeks to take advantage of *usable* elements. These elements include concepts, logical principles, observations and interpretations. Analytic eclecticism draws these from separate research paradigms (Sil 2009) and theories. These elements are then combined so that they work together (integrate) (Sil 2009) allowing us to think about something to understand it in such a way that it has been understood in all its potential details. The summary of the five paradigms and the repertoire of theories become important in this integration activity. To make this integration work, ask how other (i.e. different) types of mechanisms might interact with each other in the process of influencing the results or effects of an action (Sil 2009) or agency that are in the interests of practitioners?

Cornut's (2014: 2) 'logic of questions' becomes quite useful in the operationalisation. The 'logic of questions' proposed by Cornut (2014: 2) '…provides useful concepts for assessing and situating the contribution of different approaches in relation to one another.' The structure of questions, interrogatives (how, what, why, where, under what circumstances, with what expectations etc.), the question-answer relationship and the questions themselves, clarify logically the aspects of an issue or phenomena theories explain. The logic of questions also gives an indication of the assumptions theories presupposes. 'Considering an explanation as the answer to a question, this logic helps evaluate how an explanation succeeds or fails and is able to theorize explanations in the…' sciences (Cornut 2014: 2). Following Cornut (2014), the type of theory indicates the type of questions to be asked. What is also important to take into consideration is to realise that it is not only about asking questions for the sake thereof, but to uncover new ways of thinking about issues and phenomena.

What the logic of questions also does is that it assists in the selection of certain theories and excluding others that are contained in the repertoire of theories. It all depends on the context. If an explanation from a theory is successful in a specific interrogative context, the theory or explanation of the theory will be included, if unsuccessful it will be rejected. This is called the pragmatics of explanations and in this realm theories are chosen or excluded depending on the question asked as well as the context in which the inquiry takes place (Cornut 2014).

Cornut (2014: 10) explains how one can go about resolving the problem of identifying the context:

> When an explanation answers a question different from the question asked, it is not contextually relevant. This is common, since a question may take a very different meaning depending on the context. Precisely because the intended context is not always clear, it is necessary to specify the *contrast space* of a question… What matters is whether or not an explanation succeeds at answering a specific question asked in a particular context (emphasis added).

The contrast space of the question is therefore important. Explanations are answers to contrastive questions. Instead of asking 'why x?' which will give an exceedingly long list of answers ask 'why x rather than y?' The latter is a contrastive question. This will allow a researcher to compare the knowledge claims that are presented by different explanations. The contrasts also provide the context to the requested explanation as well as clarifying the background assumptions of the research under scrutiny (Grynaviski 2012; Cornut 2014). Contrasts also assist in specifying contributions of theories. It is for this reason that eclecticism and problem-driven research will use a combination of theories to analyse phenomena and issues (Cornut 2014). Contrastive questions also focus on explanations on the types of causes important in the explanation of an issue (Grynaviski 2012). When analysing complex problems, it is advisable to ask successive contrastive questions, since the complexity of events means that no single question can adequately explain the causal processes involved (Grynaviski 2012 cited in Cornut 2014). It is here where analytic eclecticism's aversion for *a priori* assumptions comes to the fore. Using the logic of questions method, it is possible for problem-driven scholars to investigate the most complete explanation without *a priori* assumptions from a specific theory and the metatheoretical assumptions from the research paradigm the theory is based on. The only boundaries come from the discipline the analysis is conducted from. Through contrastive 'why questions' a researcher is able to zoom in, so to speak, on theoretically important questions. Even if a theory is not used in a particular investigation, it still has potential value for analysing other phenomena under consideration. The theory can also assist in identifying a relevant contrast space of the issue being analysed (Grynaviski 2012; Cornut 2014), aiding the process of research paradigm and theoretical integration.

4.5 Conclusion

To conclude, pasting the list of research paradigms' metatheoretical assumptions and the theories' basic assumptions on a wall and throwing a dart at the two charts to identify the elements will not work. It is too much of a gamble! Then again, you might want to do it if pressed for time, but I would not recommend it. There is just too much at stake with the human condition, which demands a more thorough and thought provoking process. It will therefore be necessary to ask practitioners what is in their interest. In this way, you will, having the ethos of analytic eclecticism in mind, engage and not displace the practitioners' research paradigms (Sil 2009). Here we need to take into account that we are all theorists (Rosenau 2006) and utilise research paradigms in our daily lives (Guba 1995). Said differently, it is important to work with practitioners that are engrossed in the 'messiness' of real world problems, because they can identify and highlight the various elements and understandings of problems, their potential resolution as well as the availability of opportunities. Opportunities, as occasions when a specific situation makes it possible to achieve or do something (OALD 2013), is important to note. As such, engaging practitioners through the pragmatism of analytic eclecticism and the repertoire of theories might constitute a productive opportunity to do research for the amelioration of real world problems.

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Chapter 5
Paradigms and Theories: Popular Labels and Their Delimitation

5.1 Introduction

The definition of paradigms and theories is the subject of this penultimate chapter. I start this chapter by outlining the definition of paradigms and theories and how these definitions are used by scientists in the water research sector. In the second part of the chapter, I outline the importance of paradigms and theories. I focus on the importance of these cognitive processes in International Relations. I do this because this is the field of study I am most familiar with. This section is followed by a discussion on the importance of causality and why we need to take causality more seriously in water research. Linked to the value of paradigms, theories and causality, I then tackle the issue of the disdain research scientists have towards paradigms and theories. I conclude the chapter at the end.

5.2 Paradigms and Theories

The word 'paradigm' was introduced to the English language in the late 15th century through Late Latin from the Greek word *paradeknunai* meaning to 'show side by side.' In this sense, the word 'paradigm' is a worldview that underlies the theories and methodologies of a certain scientific subject. A paradigm can also mean 'a typical example or pattern of something; a pattern or model.' Paradigms have different meanings in different scientific disciplines, but they all relate to scientific enquiry. The sociologists, Burrell and Morgan (1979), treat paradigms as perspectives that bind the work of theorists in that paradigms are sets of ontological and epistemological assumptions (Schultz and Hatch 1996). I will follow Sil (2000), Sil and Katzenstein (2010) and Schultz and Hatch (1996) and use the word 'paradigm' in the sense of a research tradition that helps to organise and guide science/research, binds the work of a number of theorists and are sets of

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ontological; epistemological and methodological assumptions about the practice of science. From a research methodology perspective, Guba (1990: 17) defines a paradigm as 'a basic set of beliefs that guides action, whether of the everyday garden variety or action taken in connection with a disciplined inquiry.' For Warner et al. (2002: 9): 'Paradigms are sets of references that frame the way in which science, management and people understand and act upon the world around them.' From an art education perspective, Pearse (1983) says a paradigm is an internally consistent orientation serving as a platform that constructs a conceptual and operational approach to functioning in the world. In water research, Siebrits et al. (2014) write that: 'A paradigm can identify a conceptual framework that is composed of a class of common elements, theories, laws and generalisations that is widely acknowledged within a scientific school of thought or discipline.' Their definition is not clear. It is not certain whether a paradigm is an 'entity' that consists of the elements they identify or if it has a 'function' in identifying frameworks. Even so, in their text they say that they have identified a number of paradigm shifts within water research in South Africa over a period of almost 40 years. Using scientometric analyses, they note that:

> …research publications are dominated by research into technical and engineering solutions, as well as designs and plans to secure water supply. From 1992 to 2001, publications on water pollution, water quality, water resource management and planning are prominent. The second major paradigm is observed from 2001 to 2011 in which the emphasis is on planning, modelling, catchment-scale studies and a multidisciplinary approach to research (Siebrits et al. 2014: 1).

From the definitions above, we can discern a number of elements that delimit the definition of a paradigm in a specific manner. The ontological and epistemological elements indicate how we see reality and produce knowledge about that reality. The philosophies that guide action happens in a specific setting: the research or scientific environment. This is the second element. The beliefs that guide action are constituted by ontology, epistemology and methodology. This is significant because here is the first delimitation that brackets a paradigm and shows the difference between it and a practice, for instance. A paradigm deals with the generation of knowledge and guiding of action from a cognitive perspective according to certain ontological, epistemological and methodological notions. This does not mean that it is only researchers or scientists that produce, acquire and utilise paradigms. I would go so far as to say that paradigms are omnipresent in the majority of individuals' lives either implicitly or explicitly. It then follows that paradigms can guide management practices, like Guba (1990) and Warner et al. (2002) argue. Taken a step further, paradigms are the building blocks of practices and are present during the construction of practices.

Having said that, Siebrits et al. (2014) confuse the word 'paradigm' with the concept 'practice'. Their description of the so-called paradigm shifts is more in line with the definition of a 'practice', which is 'the actual application or use of an idea, belief, or method, as opposed to theories relating to it.' 'Practice' can also mean 'the customary, habitual, or expected procedure or way of doing something'

(OALD 2013) and not the way of thinking on how to do something. The implication of confusing a paradigm with a practice could be that the word 'paradigm' will be used with want and neglect—when talking about paradigms, people could actually mean practices. A proverbial cottage industry could sprout from this, leading to the incorrect application of the concept and as a consequence, incorrect research results and recommendations to practitioners. Said differently, observers in the South African water research community could bandwagon on the word 'paradigm' because of its popularity and use it to describe everything and anything that involves research practices. This confusion also holds methodological implications. Vague concepts can have negative influences; having and using nebulous concepts can undermine hypothesis testing (Mearsheimer and Walt 2013). Below I will look into the matter of hypotheses testing.

Research scientists should not confuse the concept 'theory' with that of 'paradigm'. The concept 'theory' was introduced to the English language in the late 16th century through Late Latin from the Greek word *theōria* meaning 'contemplation or speculation' from the word *theōros* meaning 'spectator.' A theory is 'a supposition or a system of ideas to explain something, especially one based on general principles independent of the thing to be explained.' A theory is 'a set of principles on which the practice of an activity is based' or 'an idea used to account for a situation or justify a course of action' (OALD 2013). Though somewhat abstract, these definitions give an idea of the elements constituting a theory. Put in simple terms, a theory is a simplified picture of reality. As such, theories tell, or explain to us how the world works in specific domains. Because the world around us is complex and difficult to understand, we make sense of it through theories. For this sense making to happen, we need to decide which factors are more important. Therefore, when studying something we leave those factors that are less important out and zoom in, so to speak, on those factors that are more important. In so doing, the world becomes more comprehensible (Mearsheimer and Walt 2013) as it gets broken down into abstract and easily comprehensible factors that describe reality.

As simplifications of reality, we can compare theories to maps that simplify complex reality so we can understand it better. Whereas maps use sketches and symbols as explanations of reality, theories explain reality through causal stories. In this regard, theories state that a particular phenomenon can be explained through a single or multitude of factors (Mearsheimer and Walt 2013). I have already outlined the components of theories: general principles, ideas, explanations, and so on. These are sometimes referred to as variables or concepts. Theories note how these key concepts or variables are defined, and this entails the making of assumptions about important role players affected by and affecting the issue or phenomenon. The identification of how independent, intervening, and dependent variables fit together is a central purpose of theories. This enables scholars to conclude or infer testable hypotheses, or how the concepts are anticipated to 'covary' (Mearsheimer and Walt 2013). To make an inference is to decide or reach an opinion that something is true based on the information at hand. What is more import, according to Mearsheimer and Walt (2013: 432) is that '…a theory explains why a particular hypothesis should be true, by identifying the causal mechanisms that produce the expected

outcome(s). Those mechanisms—that are often unobservable are supposed to reflect what is actually happening in the real world.' To summarise, theories consist of statements that actually reflect how the world works. As such, theories '…involve entities and processes that exist in the real world. Accordingly, the assumptions that underpin the theory must accurately reflect—or reasonably approximate—particular aspects of…life' (Mearsheimer and Walt 2013: 432). So, theories are not the monster under the bed that will come out when it's dark and eat the scientist or researcher while she or he is blissfully dreaming about that next scientific breakthrough. Theories are merely representations of reality so that humans can make sense of the complex world around them.

Be that as it may, the concept 'paradigm' and 'theory' are sometimes confused with one another. Khan (2002) notes that '…the confusions are fairly elementary, but remained unacknowledged.' This is what Pahl-Wostl et al. (2011) do when they talk about a 'management paradigm.' According to them, 'a management paradigm refers to a set of basic assumptions about the nature of the system to be managed, the goals of managing the system and the ways in which these goals can be achieved.' They go on to say that 'the paradigm is shared by an epistemic community of actors involved in the generation and use of relevant knowledge. The paradigm is manifested in artefacts such as technical infrastructure, planning approaches, regulations, engineering practices, models etc.' (Pahl-Wostl et al. 2011). It would appear as if Pahl-Wostl et al. (2011) confuse a paradigm with a theory because they talk about basic assumptions instead of ontological, epistemological, and methodological *metatheoretical* assumptions. I would go so far as to say that they are confusing 'paradigm' with 'practice' because they talk of management goals that need to be achieved. These are elements of policies or plans of action. In other words, metatheoretical assumptions are central to paradigms and not basic assumptions or general principles, which is the case with theories. Pahl-Wostl et al. (2011) also equate a paradigm with a mind-set, which is a representation of something and not a worldview underlying theories and methods in a scientific discipline. It is not uncommon now-a-days to hear about a 'new paradigm' or a 'paradigm shift has occurred' somewhere in the water sector. For instance, the headline to an article on acid mine drainage (AMD) reads 'Government lauded for AMD paradigm shift…' (Kolver 2012: 10). Paradigm shifts are rare occurrences (Khan 2002), so when you see such a claim in a text, maybe the writer or speaker meant a change in theoretical stance, or just a change of mind, view or practice.

The central characteristic of a research paradigm is therefore the basic beliefs about the various aspects regarding the generation of knowledge and not a way of doing things (practice). When referring to 'theory' I mean a supposition, set of principles or system of ideas to explain something and to justify a course of action. A paradigm is more holistic than a theory, which is more specific or to the point. I follow Lincoln et al. (2011) and use their typology of research paradigms. There are five science/research paradigms: the positivist, postpositivist, interpretivist/constructivist, critical theory and the participatory paradigm (Lincoln et al. 2011) (see Chapter 4). Research paradigms have specific notions regarding the nature of reality (ontology), the relationship between the researcher and the thing she or he is

researching (epistemology), the relationship between the researcher and the research object, the process of research (method), theory of truth, what the data measures (validity) and the reproduction of research results (reliability) (Guba 1990; Weber 2004). To reiterate, the basic set of ontological, epistemological and methodological beliefs in the different aspects of reality guide (research) action (Guba 1990). These are not general beliefs, but beliefs on how research should be conducted. Scientists adhering to the positivist paradigm belief that, the researcher and reality is separate and for the participatory paradigm a participative reality exists, which links objective and subjective reality (Lincoln et al. 2011).

That the word 'theory' is derived from the Greek word 'spectator' is apt. Just like 'spectators' to a soccer game, a rugby match or an athletics event, scientists are spectators or observers of what is going on in the world. More than spectators that are merely observing for the enjoyment of the game, scientists want to attach meaning to the event or phenomenon. If the event or phenomenon creates problems, the understanding is utilised for the amelioration thereof. Like research paradigms, theories are constructions of the mind (Lynham 2002). Rosenau (2003) goes so far as to say that we are all theorists every time we assess an issue or situation. It is here where research paradigms and theories start making practical sense because they are utilised by practitioners either subliminally or explicitly (Du Plessis 2000). One more thing need consideration, especially when linking research paradigms and theories to practice: the social sciences can be deeply divided over the definition and theories of human behaviour (Geldenhuys 2004). We should not see this as a disadvantage, but as a way to integrate research paradigms and theories to create opportunities and solve problems. The conceptual and theoretical divisions are therefore strengths in the practice of everyday reality.

5.3 The Importance of Paradigms and Theories

We are constantly working out the rules and patterns that govern the characteristics of the real world as well as the complex relationships we have with one another and the natural environment (McGann 2008). We use our brain to produce these rules, patterns and relationships. We determine rules, patterns and relationships not merely for pleasure. Rules and patterns are important elements of our day-to-day tasks in cultural and societal settings such as the school and workplace. To determine rules, patterns and relationships partly entails the production of theories and the utilisation of such theories in our actions and relationships. To reiterate, theories explain the connections between phenomena through the presentation of a body of simplifications that consist of interrelated assumptions, definitions, ideas and proposals (Grover and Glazier 1986; Kerlinger 1986; Koh 2013). Research paradigms describe for the holder the nature of the 'world', the individual's place therein as well as the range of possible relationships to that world and its parts (Pearse 1983; Guba and Lincoln 1994). A paradigm is an internally consistent orientation serving as a platform that constructs a conceptual and operational approach to functioning

in the world of research (Pearse 1983). Returning to theories, what is important to consider is that multiple theories can explain phenomena (Walt 1998, 2005), issues or situations. Even more profound, is that no single theory can account for everything happening in the world (Aron 1967; Albert and Buzan 2013). As mentioned previously, theories are creations of the human mind. The general purpose of theory is to create new knowledge by explaining the meaning, nature and challenges of phenomena that are often experienced but unexplained. The knowledge is used to act in a perceived, effective and informed manner (Lewin 1951; Whetten 1989; Strauss and Corbin 1990; Gioia and Pitre 1990; Lynham 2002). Theories help to guide our thinking of the unexplained and to bring us closer to an explanation of the mysterious. Theories are a means to uncover that which is invisible. A theory can be the spark of 'a-ha' moments during investigations to explain the likely cause of events. With a theory, researchers and scientists can widen their investigations to include other phenomena that are related to issues. With limited information at hand, theories assist our cognitive processes in extending their ability. Just as a loom produces multi-coloured fabrics and a variety of designs, the brain also brings forth multiple explanations of the connection between phenomena in the real world. The brain produces multiple theories not only to solve mysteries and explain our environments, but also to assist in our daily lives. Theories are inherent to the never ending cognitive processes by which we recognise experience, think about as well as understand and act.

Paradigms and theories influence the way humans perceive reality and react to it; paradigms and theories reflect reality (Wendt 1999). Emphasising the link between paradigms and practice, Katzenstein (1976: 13) says that research paradigms '…or their eclectic combination should be viewed not simply as a constant but as a variable which is closely interrelated with government policy.' This relationship between theory and practice is also explained at the individual level by Chernoff (2007: 37) when he says that: 'Decision makers may choose a policy when they have a set of factual beliefs about conditions; a set of cause-and-effect beliefs about how [actors] interact…; and a set of objectives, goals, or values, which may be part of the theory.' As already indicated, paradigms and theories and their influence on policy are not permanent. As such, they are tools that assist us in organising and communicating the large volume of data (Van Maanen 1998) regarding situations, relationships, issues and actors relative to policy (Lynham 2002).

As mentioned before, we all develop and use theories every time we assess an issue or situation (Rosenau 2003). We are all theorists, including government policy makers, journalists, academics, scientists and private sector practitioners. To be theoretical is unavoidable (Rosenau 2003). This is confirmed by Ferguson (2014: 1) when he says that: 'However much the casual observer of world affairs, harried practitioner, or naïve scholar may ignore or perhaps go so far as to mock "theory" or "theoreticians," the truth is that everyone is deeply enmeshed in theory whether they like it or not. Theory in the sense of mind-set is arguably implicit in every opinion we human beings express and every action we take.' An example of 'everyday' theory is the advice we get from colleagues, friends and family (Lynham 2002). The advice gives us a sense of what we could potentially do since the advice extends our

cognitive abilities because the cognition had already been done by others and they are merely imparting the advice. This is how (past) experience works to assist in creating opportunities, solve problems or to deepen our understanding of reality.

How we generate knowledge will have a bearing on the way in which we solve problems and create opportunities. Research paradigms and theories are part of this knowledge generation process that is part and parcel of policies and practices. This means that research paradigms and theories are the bricks and mortar of policies and practices. It is not always possible to do an experiment to solve a problem. Cognition, without the scientific method, can also accomplish problem solution and opportunity creation. Having said that, there is not only one 'dependable' way of knowing (Eisner 1990) to inform practice, but multiple ways of generating knowledge.

To be sure, research paradigms influence practice. This implies that not one paradigm is legitimate (e.g. Lake 2011) or that one theory is the basis for understanding social reality. Research paradigms and theories can function together as practitioners make sense of actual events (Hayes and James 2014). The implications of this recognition can manifest across a number of dimensions. One is the conceptual facet. Focusing on alternative paradigms can shift our manner of thinking about knowledge (and how it is generated), the mind, intelligence and cognition (Eisner 1990). What was previously hidden in the conceptual element populated by knowledge, the mind, intelligence and cognition now appears and is visible, sometimes for the first time. Here Kuhn (1962: 65) makes a powerful statement: 'Anomaly appears only against the background provided by the paradigm.' It is through the possession and visibility of paradigms that scientific discovery becomes possible (Schickore 2014). But I am not only concerned about scientific knowledge and its production.

The other aspect, which relates to the conceptual element, is practice. Seeing other research paradigms has consequences for strategies and visions, and how we evaluate practice as well as the conduct of research. There are also consequences for policies and norms, or standards of appropriate behaviour (Eisner 1990; Klotz 1995). The content and intention of policies express messages about how role players are supposed to act, how the issue is viewed and the nature of beliefs and expectations of actors' actions. Policy content also conveys an epistemology and the manner of its application. As such, policies are not only 'a set of ideas reflecting certain values and beliefs that are created to guide decision making' (Eisner 1990: 95). Polices are communication mediums that communicate certain attributes about an issue, the thinking behind the construction of issues and the way in which practitioners go about creating opportunities for change. Policies are shaped by the 'beliefs about the kind of knowledge one can trust and the kinds of methods one can use to get such knowledge' (Eisner 1990). In other words, research paradigms constitute policies. This implies that if a certain type of knowledge generation is not trusted, it is likely that practitioners will resist it and viewed it as undependable or illegitimate. The level of trust or suspicion of the type of knowledge or method is a construction of the human mind influenced by external factors such as the education a practitioner received. The psychological aspects of practitioners are potentially one of the most significant variables that influence the recognition of other research paradigms and how they integrate with traditional research paradigms.

By recognising other research paradigms and integrating those with known paradigms can have profound consequences for the policy process. By considering other research paradigms encourage us to look at the sources of practitioners' actions. Through positivism, for instance, we view action in a structured, linear and cause and effect manner. Action is seemingly well thought through, goal directed and systemic driven. Should a person want to act rationally, he or she must have specific goals. The nature of these goals will determine the methods he or she will employ. The methods, in turn, are then evaluated using their effects to determine the link between pre-specified goals and human behaviour. When one takes other research paradigms into consideration, the understandings of action's sources becomes less neat and tidy. Messiness creeps in. For instance, an institution's roles increases and qualitative thinking becomes more prominent and there is an increase in perceived complexity (Eisner 1990). Complexity is not only a way through which we perceive reality; it is also in a way constructed when we add other research paradigms to thinking. We define complexity just as much as complexity is actually around us.

Looking at issues through multiple research paradigms changes our conceptualisation of the sources of action. Goals cannot always be specified and are at times difficult to articulate. Intuition, for instance, can also play its part during the execution of actions. Research paradigms, other than, and together with positivism, can paint a more realistic picture of policy environments and how practitioners act (Eisner 1990). To further this argument, Rueschemeyer (2009: 116) argues that: 'To the positivist view, the effect of emotion on beliefs is mysterious.' He also states that emotions do interfere with cognition. This conclusion is also reached by Coicaud (2014), in his study of the role of emotions and passions in international politics. In this sense Rueschemeyer (2009: 114) is adamant that: 'Emotions engender wishful thinking and, when passionate, blind us to many features of the situation and to the consequences of rush actions… Emotions may define and "protect" the unthinkable; but passionate search for the truth is driven by emotions as well.' This implies that emotions can play a positive role in actor's cognitive orientation (Rueschemeyer 2009) and lead to subjective interpretations of issues, events and relations. If this is the case, emotions could also play an important role in the recognition or resistance to recognise alternative research paradigms. Either way, a middle ground research paradigm, the participatory paradigm, could assist to help realising that subjective knowledge (see Chapter 4) has merit in the policy process. By including subjectivity in explaining the policy process, the mysteriousness of emotions' influence on beliefs is diluted and given credence in explaining some aspects of the policy process.

The positivist paradigm has had an impact on the linkage between research and the policy process. A top-down way of interfacing research with policy has developed over the years. The researcher identifies variables with predicative effects through his or her research. The results are then shared with the rest of the research community through the publication process. Practitioners act upon results and use what has been discovered. The practitioners, therefore, do 'what works' stipulated by researchers (Eisner 1990). To a large extent the NWRS2 follows this process of development.

Integrating other research paradigms also has consequences for research products. As already mentioned, positivism is supposed to produce dependable prescriptions for action. Bringing other research paradigms in is to increase the quality of practitioners' deliberations. Research's purpose, from, for instance, an interpretivist/constructivist perspective, moves from being prescriptive to helping practitioners widen their thinking (Cronbach 1975; Eisner 1990) and understanding of reality. On this score, I believe that researchers should not prescribe to practitioners through recommendations. Researchers can also give practitioners ideas that they can creatively shape to apply in their specific policy situations. The effect of this is that researchers no longer have to find all the answers to problems and could also increase the creative rationality of practitioners (Eisner 1990). This is the outcome of creating an equal playing field between the different research paradigms, theories, researchers and practitioners.

5.4 Causality

The central element in the levelled playing field argument, is that of causation, or the role causation plays in our research paradigms and explanations of reality. Positivism views cause in a very strict and narrow way, based on the philosophical works of David Hume (1711–1776). For him the theory of causation has a number of assumptions. First, causal relations are linked to regular patterns of occurrences. Causal analysis is also tied to the study of patterns or regularities. Second, causal relations are regularity relations of patterns of observables, which relies on constant conjunctions. Third, causal relations are regularity-deterministic. This means that, based on certain observed regularities, when one type of event occurs, then another type of event is assumed to follow (in a probabilistic way at least). Fourth, causes refer to moving causes, in that they are efficient causes that push and pull (Kurki 2006, 2008; Lebow 2014). According to Kurki (2008: 6): 'These assumptions about the concept of cause are deeply embedded in modern philosophy of science and social science…' This has led to a positivist interpretation of causal analysis. What is more, this rendition is seen as the only acceptable way of doing causal analysis in the social sciences. Because of the dominance of the Humean conceptualisation of cause in positivism, there has also been repercussions for theory and theory development. The practical sense contained in theoretical assumptions has evaporated so to speak, and a narrower conceptualisation of cause has taken root. To explain this further, Aristotle's (384–322 BCE) account of cause and causation was much broader and deeper than the later Humean account. Aristotle developed a typology of causes. These are material cause, formal cause, agential or efficient cause and final cause. An example of a material cause is that of marble from which a statue is shaped. Matter is quite fundamental in any explanation and Aristotle saw matter as 'indeterminate potentiality.' Matter is a cause of something through the provision of the material from which objects can be crafted. Without marble (matter), a statue cannot be sculpted. Also of importance are the properties of

material or substance, since these properties can enable or constrain how material gets shaped. The material is insignificant when considered on its own: it has no intelligence and needs an action to become a statue. This brings us to formal causes, which are the forms, ideas or essence of things. The formal cause of the statue would be the idea, image or shape thereof. These reside in the artist's mind with formal cause being the pattern or form of something. According to Kurki (2008: 27) '…formal causes define and "actualise" material potentiality into things or substances.' Change's primary sources are brought about by agential or efficient causes. These sources could be any 'agential mover' or an 'act of doing something.' So, the efficient or agential cause of the statue is the sculptor or the act of sculpting. Final causes are the purpose of the statue. For instance, we walk and do other exercise to be healthy and by stating this, a cause is assigned to the action (Kurki 2008). Causes and speech acts are therefore interrelated.

Lebow (2014) has added a fifth type of cause: inefficient causation, which rests on the notion of singular causation. When events take place, be it in the domestic or international water sector, '[w]e can construct causal narratives about [their] outcomes, but they cannot be explained or predicted by reference to prior generalizations or narratives. Nor do they allow us to predict future events. Singular cause refers to events that are causal but non-repetitive' (Lebow 2014: 5–6, 36). Singular causes are denied by Hume (Lebow 2014) and therefore restricts us in our thinking about non-material types of cause such as norms, rules and emotions.

The typology of causes described here is 'flexible and sensitive to pragmatic concerns of explanation' (Kurki 2008: 28). Unlike the Humean restrictive notion of cause, the different types of causes outline by Aristotle and Lebow (2014), bring into focus intangible forces behind cause; ideas, norms, principles, beliefs and research paradigms and theories. These can be formal causes because they define the structure of social relations because they relate agents to each other as well as their social roles and the meaning inherent in their practices. 'They describe the rules and relations that define social positions and relationships, and hence can be seen as "that according to which" social reality works' (Kurki 2006: 207). In a sense, these non-material sources of cause can be seen as 'constraining and enabling' causes (Kurki 2006). By considering research paradigms and theories, we are able to see their value for practice more clearly.

Why are research paradigms and theories important? Since research paradigms and theories are formal causes in society and have 'constraining and enabling' effects on social relations, we are confronted with a deeper sense and level of causality in the social world than what we often recognise to be case (e.g. observable patterns of behaviour) (Kurki 2006). Having said that, research paradigms and theories are important in that they act as formal causes and, by focusing on them as formal causes, we broaden our notion of cause in society and by extension the water sector. Said differently, by studying paradigms and theories our ontological horizons are widen as to what constitute cause in the water sector and we recognise the agential power of research paradigms and theories. Research paradigms and theories also contain and explain the intentions and reasons for actors to behave in a certain way. Because research paradigms and theories are

causal, intentions and reasons are also causal '…in the sense that they signify a contributory cause that "for the sake of which" something is done' (Kurki 2006: 209). It is possible that intentions and reasons are the well-spring of everyday actions (i.e. actions we do on a daily bases) as well as policy actions, be it in the public or private sectors.

By broadening the types of causes could help us understand the various assumptions contained in theories in a more nuanced manner. In other words, where a theoretical assumption gives a Humean explanation of something that causes another thing, another theoretical assumption could explain, in an Aristotelian or Lebowean way, the reason for the primary cause to take place in the first place. For example, in the South African water sector much faith is placed in catchment management agencies (CMAs) to bring about a more sustainable way of managing the country's water resources. The argument behind this is that CMAs, as structures of rule, are less restrictive in managing water because they are a decentralised way of managing water resources as opposed to the 'command and control' way of doing under the old (apartheid) dispensation. Catchment management agencies are closer to the general population, are established in a more participatory way and therefore rely on a more inclusive governing model than the previous system (Rogers et al. 2000; Meissner et al. 2014; Meissner and Funke 2014; Meissner et al. 2016). It follows then that these agencies will be a more effective way of governing water in the respective water management areas (Rogers et al. 2000). This is an assumption that has so far, gone unchallenged. The restrictive Humean notion of cause is evident since a move from the old command and control system to a more inclusive and participatory way of governing will be good, in terms of more and better quality water for people, the environment and future generations. Bring in Lebow's (2014) notion of inefficient cause and the narrative changes. The South African government plans on establishing nine CMAs. Each CMA will be a singular cause event in that it differs in its demographic, economic, financial (material), management, ideological, values (ideational), geographic, hydrological, climatological (external biophysical), political structures and societal actor profile. Their establishment and functioning will, therefore, differ, and no generalisations or predictions on how efficient they will be to bring about sustainable management of water resources, are possible. We just don't know how successful they will be to manage water in a sustainable way under certain circumstances.

Considering catchment management agencies, it, therefore, goes without saying, that a constricted definition of theory, and the role of causation therein, may not be adequate for explaining the variety of ways in which theory is used (Buckland 1991; Pettigrew and McKechnie 2001; Lemert 2013). Such a way of conceptualising theory also holds consequences for causation and the role thereof in the water sector. This means that a theory can be defined not only in terms of its application in a particular science, such as the theories of gravity or relativity. It is also possible for theories not to follow regular laws. This is the case with the social sciences. This is not to say that scientific theories consisting of quantitative definitions, measures and relationships (Yovitz and Kleyle 1993; Pettigrew and McKechnie 2001) are wrong. By explaining social phenomena and issues in the narrow confines of science are

restrictive since not all information around issues are considered important. We, therefore, have to broaden our conceptualisation of theory, especially in terms of theory's purpose. Theories can stir emotions, stimulating a social conscience for social upheaval. Theories can also be sources of controversy and scorn and they can be new sources of thinking on how the world works (Lemert 2013).

We should also not forget that: 'Theory is always *for* someone and *for* some purpose' (Cox and Sinclair 1996: 87). Members of the different scientific communities will use the narrow view not only to advance a particular theory, but also to assert their power and influence over others (Lebow 2011). It is here where the line, differentiating theory from ideology, becomes blurred with dogma (Claassen 2013). Dogma can become the norm that motivates and drives power relations within scientific communities. The conceptualisation of theory is not only a matter of methodology or ontology. Definitions can be sources of power relations and exclusion. So too can definitions be the roots of emancipation. Theories also have the ability to drive asymmetrical power relations within a community or group of researchers. Research paradigms and theories, along with other cognitive elements, play an important part in the constitution and cause of knowledge structures that guide agency.

5.5 The Unproductive Disdain for Research Paradigms and Theories

Despite research paradigm's and theory's importance, there is an unjustified negative perception and attitude towards these mental constructs. A number of reasons account for this. The blame lies with theorists, those using theories for practical purposes, and those that have an inherent disdain towards theories. Theorists do not always make their arguments in clear terms. They do not write in plain English, so to speak (Rosenau 2003). They use complicated terminology like ontology,[1] epistemology,[2] reification, parsimony, not to mention the nomenclature used in their respective disciplines to describe their theory building efforts and the content of theories. As a consequence, theorists are seen as removed from reality where

[1]Ontology is the study of existence or being (Sparkes 1992) or the study of the general properties of things (Viotti and Kauppi 1999) and the study of what exists (Latsis et al. 2007; Lincoln et al. 2011). Ontology can also be described as the study of 'the nature of the world' (Firestone 1990: 106). Ontologies are the worldviews and assumptions that researchers us in their day-to-day tasks when searching for new knowledge (Schwandt 2007; Lincoln et al. 2011).

[2]Epistemology is the process of thinking and is defined as the nature of knowledge, the relationship between the person that knows (knower) and what may be known. It is also about how knowledge of reality is gained in other words the relationship between what we know and what we see (Blaikie and Brookfield 1987; Bernal 2002; Guba and Lincoln 2005; Lincoln et al. 2011). Where ontology is the study of the nature of the world, epistemology is how one knows the nature of the world (Firestone 1990).

problems affect individuals' lives. Theory is seen as a luxury, a wasted effort and oftentimes downright misleading (Rosenau 2003). This latter aspect is due to the competing theories that are inherent in scientific disciplines. International relations is no exception, with competing theories explaining the actors, their behaviour and political relationships within world affairs. Theories like neorealism, neoliberal institutionalism and social constructivism are all competing for attention and a better way of explaining international phenomenon. These negative perceptions and attitudes towards theory, in general, and scientific disciplines, in particular, ought not to be. Because of perceptions and attitudes, theories are considered irrelevant to policy and practice (Rosenau 2003). Nothing could be further from the truth.

This brings me to another point relating directly to the disdain of theory. Practitioners from the public, private, academic and scientific communities do not only have a negative perception towards theory in general. Inadvertently, and sometimes without knowing it, they rely on research paradigms and theories when constructing their policy-related knowledge. Linked to the attitude of practitioners, Williams and Godson (2002: 312) say that: 'There is a tendency particularly among government officials to regard the term academic as a synonym (or euphemism) for "theoretical," "abstract," "irrelevant," or "impractical."' Williams and Godson (2002: 312) note that theories, concepts and models need to be used 'judiciously' as well as with an awareness of their limitations. Should practitioners do this, theories, concepts and models can have a lot of value. In addition to this, practitioners can also have a positive inclination towards a particular research paradigm. Positivism is at times put forward as the only legitimate way of theorising and the constructing knowledge. Positivism is committed to the scientific method seeing the world as independent of the observers studying it. The observations are described in terms of law-like statements of universal applicability. Positivism encourages scholars to discover regularities in behaviour, which is then used to produce predictions (Lebow 2011). Positivism puts forward 'a belief in naturalism in the social world.' This means that the social world can be subjected to the same types of analyses that are applicable to the biophysical world. Positivism is also committed to the discovery of patterns and regularities in the social world. These patterns and regularities are divorced from the methods that are utilised to uncover them. There is a further commitment towards empiricism that acts as the final 'arbiter' of what is legitimate knowledge. These assumptions are implicitly contained in quantitative and empiricist commitments and these commitments are gatekeepers for the delineation of legitimate scholarship (Smith 2007; Coicaud 2014). This conclusion is also shared by other international relations scholars like Milja Kurki and Colin Wight (Coicaud 2014) as well as Richard Ned Lebow.

The drawbacks of positivism is summarised by Lebow (2014: 46, 46–47) when he describes the shortcomings of regularity theories.

> Regularity theories, [the preferred framework of many quantitative researchers and positivists], severely restricts our causal horizons. They cannot account for and accordingly ignore important causal patterns and phenomena, including equilibria, emergent properties, and singular causation. They cannot capture confluences, path dependency, and other forms of complex causation. Regularity theories allow predictions in domains where there are

> robust correlations, if not constant conjunctions. The latter are rare in the social sciences, and non-existent in international relations… Regularity theories offer no insight into how relations between dyads [things that consist of two parts] evolve, nor can they predict what will happen in any dyad.

Positivism is not strictly applicable to the social world as it is to the natural environment. We are, after all, not only living in a technology dominated world, but also a human-dominated world (Bastow et al. 2014). If we should discover regularities in the social world they would be weak, short-term and not useful for prediction. They are context dependent. We should be mindful that social concepts do not describe anything as concrete as organisms and molecules. For instance, there is no such thing as a social class or a tolerant society or good leadership. These concepts are all conversions of abstract mental concepts into a 'thing'. It is mistaken to apply positivism to equate these 'things' with features of the world (Lebow 2011). As already mentioned, regularities in human behaviour are dependent on the cultural context in which they are formed. The regularities exist as long as the setting is stable and the regularities have not been recognised by relevant actors. 'At best, the social world can be described in terms of punctuated equilibria. Regularities exist within social domains, but those domains are often subject to sharp discontinuities that can change the pattern of practices, how they are understood, or even the ends that they are seen to serve' (Lebow 2010: 5). Regularities can degrade and it is important to discover the conditions and dynamics that degrade them (Lebow 2010).

Said differently, should we view positivism as the only form of legitimate scholarship; we will restrict our knowledge horizons to positivism's metatheoretical assumptions. We will therefore miss out on other legitimate assumptions that could assist in generating knowledge and thereby deepen our understanding of the social world. In addition to ignoring other forms of knowledge generation, we will be unable to acknowledge, in a proper way (Coicaud 2014), the role of research paradigms and theories in water resource management. Borrowing a phrase from Coicaud (2014: 493): 'As a result, dominant paradigms [such as positivism] have had the tendency when referring to [cognitive] considerations…to be misled and misleading.' Said poignantly, by viewing and putting positivism forward as the only legitimate form of scholarship is to disqualify other non-positivist assumptions and forms of knowledge generation and agency, which is an obstacle to a satisfactory description of human and social reality (Coicaud 2014). Then there is also a descriptive and explanatory price to pay when utilising only one research paradigm. As already mentioned, aspects that are important to water resource management will be ignored and not accounted for. For instance, extreme human behaviour, such as the theft and vandalism of water infrastructure, can have important consequences for society not only in terms of cost associated to replacing or repairing such infrastructure, but also in the inconvenience to members of the public. Positivism has very little to say about such phenomena, and their emotional drivers, other than that they are anomalous to social life. 'It is therefore best to have them dealt with by psychology as the science of (irrational) emotions and passions' (Coicaud 2014: 502). Put in another way, it is difficult not to see such acts and their consequences.

What is more, such phenomena are 'beyond the analytical reach of mainstream [political sciences], and as such hold 'serious epistemological and methodological challenge[s] for [positivist social science]' (Coicaud 2014: 503). When overlooking other research paradigms and seeing them from an ideological point of view as illegitimate forms of scholarship, how will we be able to improve the human condition? I am in agreement with Coicaud (2014: 506) when he says that: 'The lack of comprehensive analysis of social reality renders more difficult the task of knowing how to improve it, and of effectively improving it.' Regarding the improvement of the human condition, I think it would be folly to overpromise the contribution of research paradigms, and particularly theories, in this quest.

Theories are unable to directly manage or address the messiness that characterise the world. Yet, '…the path toward management and amelioration can be smoothed if all concerned have a better appreciation of the value of theory and the ways in which it can clarify policy challenges' (Rosenau 2003: 8). This statement is important. The argument is significant because it does not create an impression that theories are the be-all end-all of all endeavours. Theories should not be seen as panaceas or cure all's that can create a better world in the blink of an eye. The qualification is furthermore vital since it places the emphasis on the appreciation of the value of multiple theories, and not just one theoretical perspective. This appreciation towards theories could shape people's perspective and behaviour towards the role of theories in practice. The statement dilutes the taboo of theories and gives them legitimacy. That said, and if we consider the opposite of appreciation—contempt—we can get a richer picture of people's attitudes towards theory. If we have a disdain towards theory, it is unlikely that we will see the value of theories. We will dismiss them as mere luxuries or irrelevant in opportunity creation, problem solving or creating a deeper understanding. Theories are instruments in clarifying society's challenges. As instruments they are not the answer to all water woes, but can assist us in getting closer to opportunities and solutions.

In addition, a one-sided research paradigm view of social reality can have dire consequences for the amelioration of concrete problems (Kurki 2006). 'Robust correlations' and 'constant conjunctions' are linked to prediction and generalisation and in effect to technological advancement and an (over) reliance on instrumental reason and technology to ameliorate problems. Robust correlations and constant conjunctions limit research, governance, politics and relations to be calculable and instrumental (Edkins 1999). This is not always the case, especially when considering the subjectivism inherent in research designs. According to Critchley (1999: 204) 'politics in the age of technology means the total domination of rational calculability and planning, the triumph of instrumental reason.' The reliance on positivism is enforced through the belief that theories can be defined in a strict way. Certain scientific disciplines define a theory as fundamental laws that can be formally stated and falsified (Buckland 1991) to explain, control and predict phenomena (Lynham 2002). By doing so, the human element of social action and the role humans play in the natural environment, for better or worse, is set aside.

The way we act in the world is influenced by the way we think of the world. And what goes on in the world is very much the result of the ideas and theories that

people have put forward at some point or another. Theories can be subliminal acts (Hobson 2012) and have different purposes. I will list a number of purposes to indicate to what extent theories and practice link with one another. Theories outline the questions we ask of opportunities and problems. With theories we anticipate answers since theories are repositories of previous investigations. They improve our understanding of situations and actor relationships and make for improved observation and ultimately enhanced decision-making (Morgan 2003; Hoffmann 2003; Rueschemeyer 2009). Theories help to justify actions and the shaping of responses to problems as well as justifying particular actions to problems (Lebow 2008). Opportunities, problems, anticipation, past experience, knowledge, relations, observation and decision-making are the stuff of the policy process, which ultimately boils down to the improvement of the human condition. Theory's role is not to anchor policies in timeless truths; they provide practitioners with the definitions and terms they need to understand the potential and the viability for positive change in society (Morgenthau 1958; Lebow 2008). This implies that the policy process in not set in stone and this fluid dynamic of the process is made possible through theories. That is to say that theories give credence to policies, and, more importantly, constitute the dynamic of the policy development, implementation, monitoring and the suggestion of alternatives to policies that does not live up to expectations. What is also important to consider, and it is here where research paradigms start playing an important role, is that policies are not the purview of governments only. Instead of governments being the central actors in the policy process, other non-state actors, like interest groups, also play a significant part in the policy process, either as watchdogs or those that give direct input into the course or direction of policies. In the water sector, interest groups can play these functions as well as bring about lasting changes to the policy landscape. An example of this is the influence interest groups have had over the implementation of water infrastructure projects in South and Southern Africa and elsewhere across the globe. The positivist underpinnings had been questioned by interest groups in projects ranging from the Lesotho Highlands Water Project in Lesotho and South Africa to plans to abstract water from the Okavango Delta and Okavango River in Botswana and Namibia and the contestation of the planned Epupa Dam on the Kunene River shared by Angola and Namibia. In these cases, interest groups also utilised the positivist paradigm to produce arguments against these projects. For instance, they did not invoke the critical theories paradigm by asking for a change in the economic structure of the world, and if they did, it was subliminal. A possible reason for this positivist inclination of the interest groups is that the leaders of these interest groups are natural scientists schooled in positivism. Yet, ideologically they sided with those that are not part of the dominant governance structures or political process like the governments and financial institutions that also utilise positivism, especially cost-benefit analyses in the implementation of the water infrastructure projects. It was a case of the ideology of political ecology or green politics being pitted against that of capitalism (see Meissner 2004, 2005 for an in-depth analysis of the case studies mentioned above) with the only common denominator being positivist in both camps. Yet, their proposals was very much in line with the participative

paradigm where they had, for instance, targeted the economic structure of the world that would make it difficult to implement these projects in the first place. One of the principle targets of the interest groups, particularly in the debate around the large projects like the Lesotho Highlands Water Project and the proposed Epupa Dam, was the World Bank and some of its top officials (Meissner 1998a, b, 2000, 2004, 2005).

The interpretive view of theory's purpose operates in the domain where people communicate with one another (Ferguson 2014). A prime example of this interpretive communicative paradigm is the policy debates that raged around the water infrastructure projects mentioned above. The application of the interpretive paradigm is practical. It deals with policy and practice through the interpretation of social events, phenomena and situations. Interpretivism/constructivism then devises appropriate responses to influence behaviour. The interpretive/constructive view assumes that the foundation of knowledge is the constructed meanings of stakeholders. The purpose of these constructed meanings is to make sense of, understand and interpret the world. This is different to the purpose of the positivist paradigm that is to control and predict. A critical view of theory's purpose also exists. Power is the area of interest for critical theories. It has an emancipating agenda. This agenda deals with the changing of policy and practice through critique. The critical paradigm sees knowledge as an outflow of the critique of ideologies and discourses that are needed to promote social change. The central objective of the critical view is to inform and create freedom through the process of critique and the identification of opportunities and potential (Lynham 2002). This then informs and justifies the actions of actors (Tow 2003). The interpretive and critical views of theory free researchers from the confines of positivism and assist them to look at aspects that are not in positivism's line of sight like interest groups arguing against water infrastructure projects.

Throughout this book, I argued that the positivist view is not the only legitimate conceptualisation of knowledge and agency, and by extension theory. It is here where Heron and Reason (1997: 274) makes a valid claim: 'In contrast to the view that a paradigm is, by its very nature, beyond definition and the grasp of the human mind, we believe that the mind, by its very mature, is more extensive than any worldview on which it takes its current cognitive stance.' This means that the human mind is capable of producing more than one research paradigm and even alternative research paradigms to the positivist paradigm that are just as legitimate as positivism as a way of generating knowledge and agency. We therefore have the ability to free ourselves from the confines of one research paradigm. In so doing, alternative research paradigms can free theorists and practitioners from the constraints of positivist science as the only means to generate knowledge and agency (Eisner 1990; Lebow 2010) if they wish to do so. Through the interpretive and critical views of theory's purpose, theorists and practitioners do not have to make point predictions in and of the social domain. What is more, it is very difficult, if not impossible, to predict single events. This is not to say that we fare better with trends, patterns and large outcomes 'where prediction rests on the role of reason, social selection, or some other alleged feature of the environment… All forms of

complex causation and especially nonlinear transformations…stack the deck against prediction' (Lebow 2010: 10). Following Eisner (1990) and Lebow (2010), I am arguing that point predictions are rare, if not quite impossible. Yet, that is not the point on which PULSE^3's rationale rests. What I am trying to say, and to repeat, is that prediction of cause and effect relationships should not be the focus of water research. What should rather be the focus is to utilise various paradigms and theories in an integrated manner to assist practitioners in creating a better awareness of reality that will assist them in their decision-making processes.

We will never be sure that an inductive conclusion corresponds to objective reality. Our conceptualisation of reality is a conception and reconceptualition of reality (Waltz 1979). This conceptualization is a manifestation of the brain described as a magic loom. 'Social "facts" are reflections of the concepts we use to describe social reality, not of reality itself. They are ideational and subjective, and depend on other equally subjective concepts, never making contact with anything real in the sense that temperature does' (Lebow 2011: 1228). For these social aspects to function effectively they must be valued as dynamic and not as a fixed process of knowledge generation (Lebow 2011) and agency. Social science theories are built on 'idealizations', or concepts that cannot be anchored to observable phenomena through rules of correspondence. Terms like water governance, leadership, integrated water resources management, adaptive management, rational actor, nation-state, interest group, are not descriptions of reality but implicit 'theories' about actors and contexts (Hempel 1952; Rudner 1966; Gunnell 1975; Bernstein et al. 2000). Theories explain laws, and as such are different to laws (Waltz 1979). Theories would serve no purpose if we knew what reality exactly is (Waltz 1997). If we understand the conceptualisations of society in this way, we will no longer have to energetically endeavour to predict change and hang our heads in shame when we are surprised by events in society.

Lebow (2010: 11) is adamant that: 'As so much of the social world is nonlinear, fifty plus years of behavioural research and theory building have not led to any noticeable improvement in our ability to predict events.' It is not entirely impossible to argue that precise prediction of the events in the social world is impossible. The quest for prediction in the social sciences rests on a mistaken analogy between social and physical phenomena (Bernstein et al. 2000). As noted earlier, point predictions in human affairs are quite difficult, if not impossible. A situation's source is not necessarily an actor's inherent characteristic. The complex nature of the social world can make simple statistical comparisons misleading (Bernstein et al. 2000). When people are involved in investigations, the situations being investigated become complex (Gutting 2012). People have a dynamic capacity for reflection. For instance, they have the ability to change their behaviour after discovering they have been observed (Bastow et al. 2014). Actors are in themselves complex. Bernstein et al. (2000: 47–48) have the following to say on this:

> The relationship between human beings and their environment is not nearly as reactive as with inanimate objects. Social relations are not clock-like because the values and behavioural repertoires of actors are not fixed; people have memories, learn from experience and undergo shifts in the vocabulary they use to construct reality. Law-like relations—even if

> they existed—could not explain the most interesting social outcomes, since these are precisely the outcomes about which actors have the most incentive to learn and adapt their behavior. *Any* regularities would be "soft"; they would be the outcome of processes that are embedded in history and have a short half-life. They would decay quickly because of the memories, creative searching and learning by [individuals]. Ironically, the "findings" of social science contribute to this decay.

5.6 Conclusion

This was one of Weber's (1949) conclusions too. He said that laws in the social sciences are short-lived because they either disappear or change as humans adapt to the environment and their goals and strategies evolve. This is '…in part because people come to understand these regularities and take them into account in their deliberations and strategies' (Lebow 2007: 6). In addition, popular and scholarly conceptions of occurrences change over time (Ferguson 2003). As reality changes and our observations take in the difference between periods and their events, concepts change. Research paradigms and theories are not only about control and prediction. Scholars sometimes investigate problems not because problems are important but because the problems can be tracked and so they can start to predict future trends. The elegance of the logic is seen as more important as the actual evidence (Bernstein et al. 2000). In this way scientists are detracted from other tasks such a better understanding of reality. Focusing exclusively on prediction can be a hindrance rather than a worthwhile exercise. Arguments become more complex instead of assisting in highlighting practical challenges and their betterment. Social theory's aim is to structure reality and make it more understandable by describing the association between the real world's parts and its whole (Lebow 2008). The emphasis should not be on a single theory to help us understand, but rather a multitude of theories. In addition, we should emphasise the worth of theories instead of promoting a disdain of theories. In the water sector, we are, after all, working towards the improvement of the human condition and a sustainable future.

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Chapter 6
Advancing Different Ideas

6.1 Introduction

In this concluding chapter, I will reflect on the content of the preceding text. The purpose of this chapter is to briefly consider what I said before while at the same time highlighting some of the issues raised. After summarising, I will make some concluding remarks about the centrality of research paradigms and theories in water research in South Africa and in general. I believe that the debate around the role and implications of research paradigms and theories is a pertinent, albeit an absolutely overlooked, one.

6.2 Constant Critique as a Travelling Companion

I believe that water research in South Africa is at a junction on the road to progress. Consider approaching four-way intersection. Water research is coming along and has a number of choices; go straight, turn left or right, or make a U-turn and go back. Many researchers will advise not to make the U-turn since this will imply a regression and not a progressing, or they will advise going forward. Other researchers might say that we need to make some changes after reflecting where we came from (i.e. turn left or right). Others, still, might say that we need to progress and go forward.

In the spirit of this book, I would like to say that by going back might not be a bad idea. Let us say that water research in South Africa is travelling in motor vehicle of some sort. That vehicle has rear-view and side-view mirrors. This enables the driver, water research, to see what is approaching from behind and whatever is approaching is a hazard or an opportunity. The mirrors also allow the driver to the view the road behind, in case it needs to turn around for some or other reason. So, it might not be such a bad idea to reflect on water research to see whether researchers

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might need to turn around to pick up something they have lost along the way. Such a view embodies past experience, norms, standards and traditions. These are neither good nor bad; they can give us valuable clues on where we are coming from and in which direction we are heading. Currently, water research rely on a lot of myths that are also neither good or bad, but gives us indications on how we need to conduct research. Water as a source of life is one such myth. Because of this myth, we are conditioned to look for all the 'goodness' that can right the wrongs. Good water governance comes to mind. Many argue that good water governance is the ultimate in solving the problems facing the water sector and the natural environment.

Let us now consider the notion of science as constant critique approaching from behind. As debates go in society, there would be those that would deny the 'existence' of this notion altogether and let it pass us by without incident, even making way as it go by. Then there are those that would be undecided and those researchers that would say: 'Let us stop next to the road, wave "science as constant critique" down, converse with it before making it a travelling companion on our onward journey'. I believe that should we exercise the latter option, we will not be delayed on our journey. We need to remember that water research is moving along, sometimes at a fast pass and at other times at a slower speed, so it does not matter whether we stop briefly and take on-board a traveling companion. Either way, we will progress.

We need, however, to go one step further and appoint 'science as constant critique' to act as our navigator from time to time. Constant critique might help us make some valuable decisions on our way to the intersection, or it might ask us to consider turning around, retrace a couple of kilometres to see what marvellous sights we drove past without stopping to contemplate. For instance, are we missing some pertinent questions around acid mine drainage, integrated water resources management and transboundary river cooperation? I believe we are ignoring the role of ordinary individuals and ideas in society that can help resolve some of the problems around these issues. Regarding acid mine drainage, we could ask if technical solutions will bring about the most optimal answer to this problem? We could also ask if integrated water resources management is practiced in society, at individual, business and communal level? If so, what types of integrated water resources management are people practicing when interacting with water? If there are various types of integrated water resources management, should we not discard the dominant type enshrined in national regulatory mechanisms and international conventions? When it comes to the 'bandwagon' type of water governance solutions, I think that there is more than meets the eye than what is currently practiced. 'Science as constant critique' could assist in answering these questions and reveal what we are missing. Considering transboundary river cooperation, are governments and state-centric structures like river basin commissions the most optimal way of fostering cooperation? Do these structures foster trust, or are other emotions also involved that can push or pull transboundary river cooperation into other directions? Again, I think that 'science as constant critique' can act as a direction-finding beacon, not only to answer some of these questions, but also help

formulate different types of questions that need answering. Rethinking who, why and how inquiry in the water sector is practiced, should become a foundational factor in how we conduct water research. For this to happen, we need to embrace the variety of research paradigms and theories in the spirit of critical solidarity.

Critical solidarity holds the promise of embracing various views and perspectives we utilise in water research. One of critical solidarity's most powerful potential influences on water research, is that it can bring about a change in who controls discourses in the water sector. Combined with 'science as constant critique', critical solidarity can help research (fund) managers to look at how research is fundamentally conducted, and based on that make better decisions on how to shift the balance in one direction or another.

The three case studies indicate that positivism is the dominant research paradigm and that neo-liberal institutionalist theories are at the order of the day on which the researchers based their recommendations. Throughout the case studies on climate change; the National Water Resource Strategy, second edition; and the UNDP's Water and Ocean Governance focus area, I have argued that positivism is not the only legitimate way of generating scientific knowledge. Through analytic eclecticism, I indicated that there are a lot of angles researchers are not observing. I would like to say that this was critical solidarity in action, since I did not reject positivism throughout and tried to replace it with an alternative research paradigm. I supplemented the three case studies with interpretivist/constructivist views and theories in an attempt to widen our understanding of the issues under discussion. Having said that, I am not saying that this is the only way critical solidarity should be expressed. I do believe that the way I practiced it could pave the way for more innovative ways to be developed elsewhere.

What I am trying to say is that we should not become slaves to active substantiation by following 'Meissner's way' of practicing critical solidarity. This means that readers should constantly critique what they read in this book. The examples of the active loom, water on Mars and Air France Flight 447 should help us in calibrating our thinking, and, in such a way that we will always seek to innovate and better our understanding of the role of water in the natural environment and how it can wreak havoc in people's lives while getting the better technological advances. After calibrating our thinking, so to speak, the PULSE^3 framework for analysis can aid us in our endeavours to better understand reality and the way we conduct research of and in that reality.

PULSE^3 is an analytical framework that optimises decision-making through the socio-economic analysis of policies and strategies necessary for operations. PULSE^3 facilitates a deeper understanding of socio-economic issues. PULSE^3 utilises the power of various social scientific theories to enhance a deeper understanding of potential risks and opportunities affecting organisations today and in the future. Everybody uses worldviews and perspectives to understand the world around them. These viewpoints are based on past experiences, culture, learning, social standing and a variety of other factors. Often, these perspectives are subliminally used to affect decision-making without a consideration of a holistic

analysis. When these perspectives are put through an analytical tool such as PULSE^3, we can better understand why certain decisions are made.

There is no doubt that research paradigms and theories have an influence on how researchers frame policy debates and how practitioners interpret and apply policies. Research paradigms and theories are important ideational causal mechanisms that had been overlooked for too long by the research community. How these world-views and perspectives influence policies should not be the only consideration when adopting 'science as constant critique' as a passenger. That we can use the meta-theoretical elements of research paradigms to indicate gaps in understanding is, in my opinion, the embodiment of 'science as constant critique'.

Appendix 1: My Research Journey

I developed the PULSE^3 framework for analysis after more than 20 years of research in a variety of subject matters spanning International Relations, Political Science and Philosophy. The topics include water politics, regional integration, interest groups, research methodology, regional hegemons, international political economy, philosophy, ethics, political ideology, domestic politics, European domestic politics and comparative politics. What is in hindsight has had an influence on the current thinking contained in PULSE^3's various components. It is not surprising that humans are unable to anticipate what will happen next in their lives or careers. How we start out our careers as researchers or scientists and the twists and turns it takes can be quite surprising to say the least. My research career started in 1993 when I was an undergraduate political studies student at the then Rand Afrikaans University now the University of Johannesburg. By telling my story has merits. It gives insight in how the future unfolds (very uncertainly) and who and what influence a researcher's or scientist's career. Some readers might want to skip this introductory part and move onto the PULSE^3 framework. For those who would like to keep reading, I am not promising an illustrious rendition of my research career in water governance and politics. Yet, there are one or two juicy bits, so to speak. What I would like to achieve in this preface is to give a glimpse of the past and help the reader to reflect on his or her own scholarly experience, how it has influenced her or his current thinking and what the future of water governance and politics research might hold. I will not make predictions on the subject field or sketch scenarios for how it might unfold. I will leave this to the reader to make up his or her own mind about the matter. Before I start with the memoir, I would like to talk about something more contemporary and how humans deal with problems. This is not a generalisation of how we deal with all woes, but it gives a glimpse into how we perceive of and wrestle with problems.

A conclusion like this might seem straight forward. It is in my opinion not the case. Let me explain. In 1993, I started my research career when I enrolled for a degree in BA Humanities at the then Rand Afrikaans University (RAU). In 1994, shortly after the first democratically elected government was inaugurated, I was a

second year student studying international relations. Our lecturer, Professor Maxi Schoeman, had given us our first insight into international relations theory the previous semester. It was a basic course in international relations theory covering the major theories of the time: (neo)-realism, (neo)-liberal institutionalism, capitalism, Marxism, globalism and the like. For many students it was a difficult course, me included, maybe because it was too abstract for our liking. This did not go unnoticed on Professor Schoeman. Her advice was plain and simple: just learn the theory because that is what the course in political studies is prescribing. Looking back more than twenty years, I am glad I followed her advice. Yet, we wanted to know what will happen in the foreseeable future, not only for South Africa, but also with respect to South Africa's place in the global community. The country was progressing out of isolation and was being welcomed back as a responsible 'citizen' of the community of states. In any event, we quickly got international relations theory behind us because we were about to learn about the real stuff of international politics. The second semester came and Prof Schoeman was again our lecturer.

A dynamic and interesting person, with an interest in the state and international political economy at that time, Professor Schoeman lectured us on issues on the global agenda (e.g. Schoeman 1997, 2002, 2007, 2011). Our prescribed textbook was Soroos' (1986) *Beyond sovereignty: The challenge of global policy*. Although we did not immediately realise it, the book was published eight years earlier, well before the Berlin wall came down and the Soviet Union disintegrated. Yet, our lecturer assured us that what is covered in *Beyond sovereignty* is just as pertinent today as it was eight years previously. One of the issues discussed in the book is that of natural resources and nations' dependency on the natural environment for economic goods. I remember the day when I became interested in water politics or hydropolitics as it is also known. Prof Schoeman lectured us on oil and its importance in the (international) political economy of nations as well as the profound influence the oil embargo of 1973 had on the relations among nations and international financial institutions like the International Monetary Fund and the World Bank. After discussing the importance of oil, she said something that made me quite curious to say the least: 'If you think oil in the Middle East is a hot topic, have a look at how water will influence the relations between nations in that region in the coming decades'. I decided to investigate further.

The catalogue search I did in the library after the lecture found a number of articles and books on the subject of 'Water politics'. Surely enough, Prof Schoeman told us about something that was not abstract but real. The catalogue listed works by Agnew and Anderson (1992), Beschorner (1992/1993), Falkenmark (1986), (1990), Gleick (1993a, b), Kolars (1986), Le Marquand (1977), Le Roux (1989), Lowi (1993), McCaffrey (1993), Mumme (1985), Naff and Matson (1984), Roberts (1991), Starr (1991), Thomas and Howlett (1993), Vesilind (1993), Visser (1989) and Vorster (1987–1988). I started reading and found that the study of water politics, unlike war, was not an old topic under consideration by scholars the world over. Yet, one thing that struck me was that it fitted neatly in the discipline of

international relations. The subject matter was also interesting since it did not cover the conventional subjects like war and international organisations like the United Nations. What I started to think about is why would states cooperate or go to war with one another over a renewable resource like water, unlike a non-renewable resource such as oil.

Over the next few years I would read more about the topic and how it relates to international relations. What I did not realise at the time was that all these studies focused exclusively on the state as the primary actor in transboundary and national water politics. I must confess that it did not bother me at the time, since I was taught that global politics was about the relations between states. Neorealism and neo-liberal institutionalism was clear about this. Constructivism, as an alternative theory, in international relations was still in its infancy. In 1989, Nicolus Onuf published his book *World of our making*, wherein he introduced the theory of constructivism. At the time I researched water politics and how it manifests in international relations, Wendt's (1999) *Social theory of international politics* was not yet on the shelves. In broad strokes, constructivism does not place the spotlight on the state or international organisations or multinational corporations like neo-realism and neo-liberal institutionalism. Rather, for constructivism norms and ideas are the driving forces of social interaction and consequently global politics (e.g. Wendt 1999). As students we did not know about constructivism, and if it was taught to us, it was just another abstract theory, or so we felt at the time. We were after all, more interested in the concrete and material things in world affairs. The civil war in Yugoslavia was raging and we wanted to make sense of that quagmire of ethnic and religious animosity. The role of the United Nations in that bloody civil war was also a curiosity.

It was in 1997 that I started doing 'serious' research on the subject of water politics and by the end of 1988 I completed my Masters' thesis on water as a source of political conflict and cooperation. The study was a comparative analysis between the situation in the Middle East and Southern Africa. I compared the circumstances between four transboundary river basins: the Orange and Okavango Rivers in Southern Africa and the Jordan and Tigris-Euphrates Rivers in the Middle East (Meissner 1998a). My supervisor was Prof Deon Geldenhuys, a well-known South African academic that had done much scholarly research on the South African state during its isolation years and after the demise of apartheid (e.g. Geldenhuys 1984, 1990, 1998, 2004).

Yet, this is not how I will remember Prof Geldenhuys and his contribution to his students. One of the most important lessons that Prof Geldenhuys imparted on us, as aspirant researchers, was that one should always question everything and everybody and always motivate your answer. During our classes he presented some of his work and asked us to critique it. It was difficult and sometimes intimidating; we were not used to questioning those who taught us. However, it started a culture of critical thinking. I did not realise it at the time, but this critical style of thinking would remain with me until today. During research for my Masters' thesis I realised that the issue of state conflict and cooperation is not as straightforward as it appeared. This was to be one of my first, albeit subliminal, experiences with

complexity thinking. What I also learned during the research is that it is not only states that are involved in water politics. Non-state entities, such as environmental interest groups, can also be political actors in water politics especially when it comes to the implementation of water resource projects such as dams and irrigation schemes. A case in point is the involvement of Greenpeace in their campaign against Botswana's Southern Okavango Integrated Water Development Project (SOIWDP) in the mid-1990s. The plan was to divert water from the Okavango Delta to supply De Beers' diamond mines in northern Botswana. After perceived pressure the government backed down on its plans for supplying mining operations from the Okavango Delta (Neme 1997; Meissner 1998b). There was more to water politics than mere interstate relations, the financing of water projects, the supply of potable water to economic nodes and urban centres, the protection of the environment and people as rational actors that always make cost-benefits analyses in the face of uncertainty. Emotions and individual livelihoods also played their part in politics and particularly water politics.

I was intrigued by the phenomenon of non-state actors in water politics. I started reading up on the subject and soon found that there was a surfeit of non-state activity, particularly in river basins where water resource management projects, particularly large dams, are constructed or considered. International river basins were no exception. For instance, when the Namibia government decided to utilise water from the Okavango River in the late 1990s to supply water to its dry northern regions, it got stiff opposition from interest groups in Botswana and elsewhere in the world (Meissner 1998b). I soon realised that international relations and the phenomenon of interest groups were interconnected. This realisation led me to enrol for my doctorate in International Politics at the University of Pretoria's Department of Political Sciences. Incidentally, and shortly after enrolling and starting my studies, Prof. Maxi Schoeman became Head of the Department. Professor Anton du Plessis became my supervisor after the previous Head of the Department; Professor Marie Muller was promoted to the position of Dean of the Faculty of Humanities. She was my supervisor during the first two years of my research and could no longer supervise students because of her ever-increasing work-load. Prof. Du Plessis did an excellent job in supervising my thesis. He has a keen interest in international relations theory, the subject we found so abstract when we were undergraduate students. Early on in my studies he introduced me to work of the eminent American International Relations scholar, James N. Rosenau.

Rosenau's works had a profound influence on my research career. His explanations of change in world politics, the ascendency of non-state actors onto the stage of world politics, the ins and outs of theorising and the variety of actors involved in issues like global climate change, resource depletion and migration (Rosenau 1980, 1990, 1997, 2003a, b) immediately appealed to me. For the thesis I based much of the framework for analysis on the various works of Rosenau and in particular *Turbulence in world politics* (Rosenau 1990). Because Prof. Du Plessis was a keen reader of international relations theory, he encouraged the reading of theory. At first I did with dread; remembering my days as a second year student dealing with those abstract things. Yet, the more I read international relations theory

the more I started enjoying the subject. This was maybe because I was now a more mature student and could link the real with the abstract more readily. I enjoyed it so much that I ended by discussing nine theories in my thesis (realism, liberal pluralism, interest group pluralism, interest group corporatism, modernity, the hydrosocial contract theory, risk society, political ecology and social constructivism) rejecting most of them and adopting social constructivism as the theory on which to base my study. The role of norms [as standards of appropriate behaviour (Klotz 1995)] played an important role in the developing of arguments for or against large dam projects. The emphasis of norms helped to put the study on a sound footing. What's more I also discovered that the various interest groups campaigning against certain aspects of the Lesotho Highlands Water Project and the proposed Epupa Dam in the Kunene River, had unique identities that influenced the norms they developed (Meissner 2004). For instance, the minority and pastoral OvaHimba people living in Namibia's Kaokoland organised themselves into a communal interest group and opposed the construction of the Epupa Dam based on their cultural and spiritual believes. For them, the river is not on a source of water and food for their vast livestock herds, the river also has spiritual significance in that they bury their people near the river (Meissner 2005; Meissner and Jacobs 2016).

Another scholar, whose work I discovered on a research trip to London, England, in late 2000 was that of John M. Hobson. His *State in International Relations* (Hobson 2000) laid the conceptual foundation of my thesis. What I found fascinating about the study was his classification of state agential power and how various international relations theories treat the 'agential power' of the state. What intrigued me was his argument that neorealism, which is naturally associated with the state and the strength of states through mechanisms like the balance of power, accords *low* agential power to the entity. The reason for this is basically because neorealism puts the state on some kind of pedestal and does not look at it through the lens of reflexive agential power. Where agential power is the ability of the state to implement foreign and domestic policy without the interference of other actors or the structures in world politics, reflexive agential power is the ability of the state to embed itself into normative and class structures to increase its ability to implement foreign and domestic policy (Hobson 1997, 2000, 2001, 2002; Hobson and Ramesh 2002). The ideas around agential power were pivotal for my doctorate because I investigated how interest groups influence policies and practices in the construction of large dams on international river basins (Meissner 2004). I had taken non-state actors and looked at their behaviour vis-à-vis the state in transboundary rivers. By doing this I moved away from the state-centric approach of investigating water politics in transboundary river basins. By adopting social constructivism, I was also stepping more and more into the domain of interpretivism and critical theories.

While I was busy with my doctorate I was working as a Research Associate for the African Water Issues Research Unit at the University of Pretoria. The Research Unit conducted research on various topics relating to water politics. The research I conducted for the Unit and some of its clients led to travels to various parts of Europe, the Middle East and Southern Africa. In September 2001, I was on a visit to Israel, Jordan and Palestine, conducting interviews with Middle Eastern water

experts. On September 11, 2001, I was conducting an interview with an engineer from an engineering consultancy in the Westbank, a short distance from Yasser Arafat's compound. I had travelled from Tel Aviv to Jerusalem that morning by bus, and then from Jerusalem to Ramallah by taxi. I finished the interview and my host phoned the taxi to take me back to the bus station in Jerusalem. On arriving back in Jerusalem I noticed more than the usual number of soldiers at the bus station. It was a Tuesday and the Jewish weekend was still three days away, so the soldiers could not have been going on weekend leave. I boarded the bus and shortly after leaving Jerusalem a gentleman, sitting two seats in front of me, got a call on his mobile. He answered and spoke in English with an American accent. I remember him saying to the person on the other end: 'This is the one we have been waiting for.' Then he asked: 'Was the Pentagon also hit?' On arrival in Tel Aviv the images of the burning World Trade Centre dominated the television screens in cafes and eat outs. I approached the gentleman I heard talking on his mobile and asked what had happened. He told me about the terrorist attacks on New York and Washington, D.C. He was visibly shaken by the event, and I offered my help. He said that he was shocked but all right; he was an American government official working for the Pentagon, one of the targets of the attack and he feared that some of his colleagues might have perished in the attack. Over the next few days as the events unfolded it became clear to me that non-state actors are not only involved in transboundary river basins, but can be major and often deviant or delinquent players (Geldenhuys 2004) on the international stage. My former supervisor, Prof. Geldenhuys (2004: ix) summarises the events and the role played by non-state actors as follows:

> The kamikaze attacks on New York and Washington have taken terrorism to an unprecedented level of death and devastation. The destructive power at the disposal of a non-state organization has been highlighted as never before: the target whose vulnerability was so starkly exposed, was none other than today's sole superpower [the United States of America]. The world now knows for sure that seriously offensive behaviour in the realm of high politics – directly threatening the peace and security of countries – can no longer be associated with fellow-states only; it can also emanate from non-state actors, especially terrorist organizations.

The reason for the soldiers at the bus stop became apparent: the Israeli military had mobilised its entire army in preparation for attacks on Israel itself. The following day I flew to Jordan and a few days later onto London. What struck me on the flight from the Jordanian capital Amman to London was how empty the airplane was. People were clearly afraid to fly and I had witnessed some emotional scenes on Amman's Queen Alia International Airport when loved-ones said goodbye to their children, spouses, fathers, mothers and parents. The non-state actor, behaving in a deviant and delinquent fashion, had touched the lives of people on the other side of the world in a region where the threat of instability and even war is always a looming possibility.

While in Jordan I took time out of my schedule to travel to the Dead Sea. My tour guide was a local taxi driver, a native from Iraq. I have always heard about the cultivation of bananas in the Jordan River valley just before the river enters the

Dead Sea. Travelling from Amman south into valley, you enter the lowest terrestrial points on the planet—the Dead Sea valley. The thermometer on the Nissan's dashboard displayed the outside temperature—a staggering 48 °C. Not long after we entered the valley, we came across the first banana plantation of many (Fig. 1.1). I was amazed and somewhat amused that a tropical fruit could be cultivated in such a dry and desolate environment. It was only possible because of irrigation. As someone studying water politics, it brought home the lengths economies would go to, to reduce their dependence of agricultural produce on other countries. There is also something else. I took the photo of the plantation and said to myself that it is quite unbelievable. My tour guide responded quite proudly that the Jordanians have been doing it for years. His body language told me that this was not only about self-reliance, but that a sense of pride in accomplishing such a feat also plays a role (Fig. 6.1).

Another incident during my visit to the Dead Sea showed the animosity the peoples of the Middle East have towards one another. Along its shores, the Dead Sea is dotted with resorts and hotels with hefty entrance fees. We decided to stop at one of the local and more informal sites where people can still enjoy the Dead Sea without paying a high price. At one of these places, an Arab gentleman and his son had set up a makeshift freshwater outlet. Their main business was selling freshwater to those venturing into the salty water. With the freshwater tourists could rinse the salt from their hair, skin and eyes. The Arab gentleman was already elderly and he was curious about me and where I was from. He could not speak any English so the taxi driver translated. The water vendor asked me my name. I replied and he then asked what type of name it was. The taxi driver translated asking where this name

Fig. 6.1 The banana plantation in the Dead Sea valley I photographed a few days after the terrorist attacks on New York and Washington D.C.

and surname originally comes from. I said Germany. My father was a German that immigrated to South Africa in the early 1960s. The Arab gentleman said to the taxi driver that he likes the German people very much, especially Adolf Hitler. I asked why. His reply was that it is because he murdered the Jews! I was stunned and only then realised how deep the hatred for one another can be in that part of the world.

My research trip to the Middle East was certainly the most memorable one. Shortly before the completion of my thesis, I decided to leave the African Water Issues Research Unit and struck out on a different research path: regional integration. Another trip that stands out was a visit to Lesotho working for the South African Institute of International Affairs. Lesotho is a wonderfully beautiful country and unlike Israel or Jordan, rich in water resources. I was the editor of the *SADC Barometer*, a quarterly publication by the Institute. The Barometer focused on regional integration trends and events in the Southern Africa Development Community (SADC). I decided that because my doctorate was nearing completion, I had made my mark on water politics research. I had been invited to numerous overseas conferences and workshops and was considered an expert, together with a handful of other international scholars, on the issue of virtual water. Who we come into contact with will not always lead to a favourable working relationship. One thing that I learned during my time at the University of Pretoria is that other people's psychological pathologies and personality disorders can play an enormous role on the future of our lives (Fig. 6.2).

After a year at the South African Institute of International Affairs, I joined a provincial government department. The Gauteng Department of Public Transport Roads and Works had just established the Directorate: Research, Analysis, and they

Fig. 6.2 The makeshift freshwater vendor's business on the shores of the Dead Sea

were looking for staff with experience in research to help foster the Directorate. The role of the Directorate was to conduct research and policy analysis on behalf of the Department and at times the Gauteng Provincial Government. After staffing the Directorate, we started conducting research mainly on the socio-economic conditions of Gauteng's citizens in the so-called top twenty townships. We would also from time-to-time do research and analysis for the Gautrain, which was at that time still under construction. I was a deputy director and headed a sub-directorate. For almost three years I gained experience in the inner workings of a government entity. I experienced the day-to-day challenges and opportunities government officials have to face to get the job done. In 2008, I decided to look for greener pastures. The political battle between the then President Thabo Mbeki and his Deputy President Jacob Zuma had a negative impact on the organisational operations of the department. The fault lines in the ruling African National Congress did not only cut across the party itself, but also across government departments. Loyalists to both camps in government pitted against each to such an extent that in the Department work literally came to a standstill. My research career suffered and I decided to move on (Fig. 6.3).

Fig. 6.3 The Dead Sea shore, the Arab gentleman is seen walking away towards the parked motor vehicles

I applied for a position at a large financial institution got the job and stagnated further. On the first day I was supposed to start working, my boss was quite surprised that it was actually my first day. They did not expect me, although I had been in contact with them just two weeks prior to me joining the team. I had no access to a laptop or internet. I was told that I should take it slow, learn the inner workings of the organisation and it was only after three months that I got my first assignment. The team I joined did work for the top executives advising the chief executive officer and his deputies on socio-political matters that could affect business. Yet, when the time arrived to do something meaningful I had stagnated to such an extent that it was literally impossible to get up to speed and do some proper research. It was nonetheless an experience. I realised that the negative connotations attached to government and service delivery, the private sector is almost no different. I also learned that the private sector can also be a powerful actor affecting the lives of individuals and the political and economic outcome of communities. My experience in the private sector had taught me further that government is not the only important actor in the political and economic scheme of things. I left after two years and shortly afterwards joined the Council for Scientific and Industrial Research in 2010.

The lessons learned over the years, the experiences working in government and the private sector paid off. I was back in water research; this time as a Senior Researcher in the Water Governance Group (to be named the Integrated Water Assessment Group in 2015). The Group consists of a small number of social scientists, which is rare for the Council with its focus on natural scientific and industrial research. Working for the group has given me an appreciation of the differences between the way in which natural scientists and social scientists conduct research. The paradigms are different, the theories are dissimilar and the methodologies are also not always in line. There is one thing that we and our natural science colleagues have in common and that is we believe in fieldwork and observing how water governance and politics impact on people's lives, the environment and vice versa. This is not to say that I did not do fieldwork in the institutions I worked for previously. While at the Gauteng Department of Public Transport, Roads and Works, we visited informal settlements and were confronted with the stark reality of the day-to-day lives of the poorest of the poor in South African society. At the CSIR this does not go us by, but there is the added dimension of the way how different scientific disciplines think about the issue of poverty and the lack of access to water in the communities we visit. For the natural scientists a rational way out would be to connect people to water infrastructure, for the social scientists it is more about how people are interacting with one another in attaining such an outcome.

The difference in perceptions between the natural and social scientists is the foundation of PULSE[3]. The ideas, concepts, theories, frameworks, models and paradigms scientists create during their research endeavours are some of the most important aspects in better understanding society and the human condition. The application of such mental constructs helps us to unravel problems and give us a better understanding of reality. The advancement of any field of enquiry depends on scientists constantly creating new ideas; replace theories with better ones and critique the use of predominant paradigms (e.g. Easton 1985; Kickert 1993; Dent et al. 2005; Gibbs 2010; Koh 2013; Kaku 2014). The development and use of the tools of a scientist's trade are significant activities for any discipline (Koh 2013). Without the constant development and betterment of these tools, innovation is either lacking or continuing in stutters without making real progress. Innovation is not only essential for the advancement of scientific disciplines, innovation is also necessary for the survival and growth of human-created entities such as organisations, government departments and private businesses (Bello et al. 2004; Aragón-Correa et al. 2007).

I believe that there is currently a lack of innovation in the South African water research community. Old-style theories from European scholars are duplicated and critical thinking is hard to find. What is also obvious is the over-use of the scientific method or positivism in finding answers to the country's water woes. The description of science as a well-ordered mechanism that helps us understand the world, gather facts and data has a very strong influence on the South African water research community. Yet, what if we turn this on its head, and, like, Firestein (2013) say that there are those that look upon the scientific method as this well-ordered practice, but then there are those that say it is actually nothing more than 'farting around…in the dark.' This boils down to the way we perceive science and how we pursue it. Data is collected and put into books, reports, scientific articles and technical guidelines. I believe that the South African water research community, or at least the largest majority of its members, are looking at things that have already been done and researched. What the community is not doing is looking at those things that still needs to be looked at; the missing things in the water sector. Ironically, ignorance, and not in the pejorative sense thereof is not followed. People are just not curious enough to find out what is it that we are missing in the water sector. It is as if Soroos's *Beyond Sovereignty* is rehashed over and over, but there is no one telling us what else there is that could be of interest, or what issues could create problems in future or how can we be critical in our thinking and knowledge generation.

Appendix 2: Theories for Practice

Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Agential power	Hobson (2000)	Interpretivist/ positivist	International relations, historical sociology, comparative politics	• Agential power relates to the relationships between actors in society (Hobson 2000) • A 'structurationist' approach is applied in this framework, which encompasses a comprehensive 'both/and' understanding. The logic behind this approach rests on the premise that strong states and strong societies can exist at the same time and a more levelled playing field exists. There are no clear trade-offs of power capabilities between actors. Said differently, it is not always clear that what the one gains, the other loses (Hobson 2000) • Different types of agential power exists domestic, international and reflexive agential power (Hobson 2000, 2001, 2002; Hobson and Ramesh 2002) • Domestic agential power is the ability of the state to develop domestic or foreign policy and shape the domestic realm free of domestic social-structural requirements or the interests of other actor (Hobson 2000, 2001, 2002; Hobson and Ramesh 2002)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• International agential power concerns the ability of an actor to make foreign policy and shape the international realm free of international structural requirements or the interests of other international actors (Hobson 2000, 2001, 2002; Hobson and Ramesh 2002) • Actors possess 'embedded autonomy' or 'governed interdependence', which can also be referred to as 'reflexive agential power' (Hobson 2000: 227). 'Reflexive agential power' hints at the 'ability of [an actor] to embed itself in a broad array of social forces…', that is class and normative structures. Hobson's idea of 'reflexive agential power' is that as an actor becomes more reflexive, its governing capacity grows, because it is less isolated from society and other actors. If, for instance, the state succeeds in broadening its network of collaboration with a comprehensive range of social forces and state and non-state structures, it increases its power • Agential power gives actors agency to influence their environment and each other (Hobson and Seabrooke 2007)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• States are not the only actor that poses agential power; non-state actors can also have agential power (Hobson 2000)
Ambiguity theory of leadership	Alvesson and Spicer (2011)	Interpretivist	Business management	• Versions of leadership are invented or constructed by people when people draw on their assumptions, expectations, selective perceptions, sense-making and imaginations on leadership (Alvesson and Spicer 2011) • Leadership exists only as a perception and not a viable scientific construction (Calder 1977: 202 cited in Alvesson and Spicer 2011). Leadership varies from person to person and context to context (Alvesson and Spicer 2011) • Because of the different meanings people attach to the concept, it is difficult to say exactly what leadership is and therefore we should see it as a construct that is an ambiguous and contradictory phenomenon (Alvesson and Spicer 2011) • Not only that, leadership is complex and at times downright incoherent (Alvesson and Spicer 2011) • The different meanings and constructs people attach to the concept, brings out the potential for ambiguous interpretations, understandings and experiences of leadership (Alvesson and Spicer 2011)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Ambiguity and fragmentation is at the centre of the leadership process (Alvesson and Spicer 2011) • Leaders need to cope with ambiguity. This ambiguity has the effect that leaders do not always know what their roles are (Alvesson and Spicer 2011) • Leadership itself is highly ambiguous (Alvesson and Spicer 2011) • Leadership is a blurred concept like goodness that could almost mean anything and everything (Alvesson and Spicer 2011) • As such people use the concept to reach certain goals that they find desirable (Alvesson and Spicer 2011) • These objectives could include: attributing responsibility to senior managers for numerous outcomes, booting the identity of managers, selling leadership courses and creating faith that leadership hold solutions to the miseries of the workplace (Alvesson and Spicer 2011). In other words, the utility of the concept serves as a lever to create certain things, especially making us belief that leadership can do

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				wonders, which is not the case according to Alvesson and Spicer (2011) • We need to problematize leadership and recognise and acknowledge its limitations (Alvesson and Spicer 2011). Leadership should not be seen as the panacea • The attributed meanings of leadership are important sources of ambiguity. The sources of ambiguous meaning of leadership are leaders, their followers and the context in which leaders and followers operate in (Alvesson and Spicer 2011) • Leaders are not always sure about what it means to do leadership, and what they are doing is actually leadership (Alvesson and Spicer 2011) • Followers interpret different acts as leadership (Alvesson and Spicer 2011) • The context has a tendency to promote different understandings and ideas of what it means to lead (Alvesson and Spicer 2011)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Complexity theory	Weaver (1948), Bak and Paczuski (1995), Bak (1996), Shermer (1997), Byrne (1998), Cilliers (2000, 2001), Rosenau (1996, 2006), Pahl-Wostl (2007a, b), Ramo (2009)	Positivist	Ecology, physics, genetics, international relations, computer science, organization studies, business management	• The central idea of complexity theory is that of systems, be they ecosystems, market systems or social systems that have a whole as well as parts (Nooteboom 2007; Pauly and Grande 2007; Albert 2007) • Complex systems consist of a large number of elements and phenomena that interact in a dynamic fashion, which has an influence on the entire system (Rosenau 1996; Cilliers 2000, 2001; Rosenau 2006; Bousquet and Curtis 2011) • When these dynamical systems organise themselves into a critical states, then complexity has occurred (Bak and Paczuski 1995) • Relationships happen in an open arrangement through a variety of indirect and direct non-linear feedback loops. This means that is no clear boundary between the system and its external environment (Rosenau 1996; Cilliers 2000, 2001; Rosenau 2006; Bousquet and Curtis 2011) • Boundaries are both changing and leaky. This is an enabling rather than a constrictive characteristic because signals can freely flow between the system and it

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				external environment (Rosenau 1996; Cilliers 2000, 2001; Rosenau 2006), which enables the system to respond to these signals appropriately • There is no central control or fixed hierarchy. This means that structures are temporary and unstable which enables the system to respond to these signals appropriately (Rosenau 1996; Cilliers 2000, 2001; Rosenau 2006) • A change in part of a system can affect numerous other parts through a domino effect (Bak 1996; Ramo 2009). These changes do not have to be large; small events can have profound implications for the system (Rosenau 2006) • History is the systems memory with history influencing behaviour of the systems and within the system (Rosenau 1996; Cilliers 2000, 2001; Rosenau 2006) • History is non-linear, it is not the same along its trajectory, there are bumps and accidents (Nye 2010) that can, as mentioned above, change the course of direction in the system • The components or agents of such a complex adaptive system are capable of

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				behavioural self-organisation into orderly systems resulting in novel attributes. This means that a system can evolve into something new while retaining it old characteristics (Rosenau 1996; Bousquet and Curtis 2011) • This evolution takes place, paradoxically, independently and in concert with the environment the system finds itself in. If the system does not do so, it can become extinct (Rosenau 1996) • Complex systems are therefore adaptive to their environments (Pahl-Wostl 2007a). As complex adaptive systems, they are dynamic, in a constant state of evolutionary or co-evolutionary flux, with unpredictable outcomes at the order of the day (Hoffmann 2003; Meissner and Jacobs 2016) • This complex adaptation is a result of feedback process between the adaptive actors and the dynamic contexts (Hoffmann 2003; Bousquet and Curtis 2011) in which they find themselves • Actor behaviour facilitates adaptation through unchanged and self-evaluative rule models, and as actors evaluate their rule models they change them accordingly (Hoffmann 2003)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Cultural theory of International Relations (Psychological constructivism)	Lebow (2008), Hymans (2010)	Interpretivist	International relations, security studies, democracy studies, history, philosophy, psychology	• Spirit (motivating people to participate in civic life and gives rise to self-esteem), appetite (the need for material things that can corrupt) and reason are fundamental drivers with distinct objectives or ends (Lebow 2008). These aspects are the source of typical forms of behaviour that have dissimilar implications for cooperation, conflict and risk-taking (Lebow 2008) • Spirit, appetite and reason are requirements for and assist in the creation of distinct forms of hierarchies based on different forms of justice (Lebow 2008) • These hierarchies sustain order at the individual, state, regional and international levels (Lebow 2008). When the discrepancy between behaviour and the principles of justice becomes great and obvious, order breaks down (Lebow 2008) • Order and disorder at any level has implications for order at other neighbouring levels (Lebow 2008). The three motives are present, and often fear as well, to varying degrees (Lebow 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Real worlds are lumpy; the mix of motives differs from actor to actor and among the collectives they organise (Lebow 2008) • Reason is able to contain spirit and appetite, but such a balance is rare among individuals, are hardly ever reached by societies and is absent in regional and international systems (Lebow 2008). Imbalances occur when reason cannot control spirit and appetite; imbalances are associated with the with the failure of elites to adhere to the restraints of the rule emanating from their offices as well as changing conceptions of justice that deprive the existing hierarchy of its legitimacy (Lebow 2008) • Mechanisms can transform imbalance into social disorder and breakdown. When there is no reason, competition for honour and standing (spirit) or wealth (appetite) can overstep the accepted constraints and lead to a fast unravelling of order (Lebow 2008). Spirit, as an imbalance factor, operates at the elite level and become dangerous when an imbalance takes place in the direction of intra-elite competition. Imbalance in towards appetite by elites can

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				lead to imitation and resentment by others and it can risk social disorder through the violation of norms and increasing class tensions (Lebow 2008) • Social orders at all levels go through cycles of consolidation and decline. Since fear-based worlds are difficult to escape from, realism is the default social condition (Lebow 2008) • Human history is cyclical, as realists contend (Lebow 2008). There are historical trends where societies have evolved from appetite based entities to those influenced by spirit and then back to appetite-based worlds (Lebow 2008) • A further evolutionary path is a return to a spirit-based world that is not a warrior society, but a society with diverse (and competing) forms of standing and recognition (Lebow 2008) • This evolutionary path is discontinuous and not uniform and not driven by a single dialectical process (Lebow 2008). Breakdowns of existing orders are essential, since they bring about change and stimulate learning. Technological, intellectual and social changes are driving forces that lead to transitions between appetite, spirit and fear-based worlds (Lebow 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Everyday International Political Economy (EIPE)	Hobson and Seabrooke (2007)	Interpretivist	International relations, international political economy, sociology	• Everyday international political economy (EIPE) is the opposite of regulatory international political economy (RIPE). As such, EIPE do not ask 'who governs and who benefits and how is international order regulated?' but rather 'who acts and how do their actions produce and change the world economy in various spatial dimensions?' (Hobson and Seabrooke 2007) • By asking this latter instead of the former, new sights of agency will be unearthed (Hobson and Seabrooke 2007) • This means that those actors that are normally power takers are then conceptualised as power givers (Hobson and Seabrooke 2007) • If the EIPE question is asked it will also highlight how governmental processes are influenced by bottom-up processes and not just those emanating from the top (Hobson and Seabrooke 2007) • The theory is based on the 90/10 principle, where the bottom 90 % of the world can have an impact on the top 10 % of the powerful population of the world (Hobson and Seabrooke 2007)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Not all bottom-up actions affect the world economy since dominant elites also play a role but not an exclusive role (Hobson and Seabrooke 2007) • If we place our attention on the actions of bottom 90 % then we will learn more about the power and the limitations and legitimacy and authority of the dominant elites (Hobson and Seabrooke 2007) • The legitimacy of the top 10 % that rules is questioned and sometimes rejected by the bottom 90 % not only through protest but also through subtle forms of everyday resistance that drives change (Hobson and Seabrooke 2007) • One of the reasons why actors reject legitimacy is because it clashes with the rejecter's identity that is created within broader publics through everyday actions. Identities are not only created and maintained they are also reshaped and discarded and by understanding these processes we will get a better appreciation of the operation of economic, political and societal systems (Hobson and Seabrooke 2007)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Everyday actors cannot behave as they please, structures are restrictive and at times actors can be victims and at other times they do have agency to affect change. Agency can always be expressed, however big or small. Even the structures are the product of everyday actions (Hobson and Seabrooke 2007) • Everyday actions are the acts of agents that play a subordinate role within a power relationship. These acts can take the form of negotiation, resistance or non-resistance, which can occur suddenly or over a period of time. The acts shape, constitute and transform the political and economic environment around and beyond everyday actors (Hobson and Seabrooke 2007) • Everyday actions are not necessarily resistance or seen as the weak winning the strong or conceived of being strategic, they can be subtle forms of deviance in the form of verbal taunts, subversive stories, rumour (Heywood and Seabrooke 2007)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• These acts play out at the mesolevel but can have ramifications at the national and even global levels (Hobson and Seabrooke 2007) • Bottom-up changes can take place through three actions: defiance, mimetic challenge and hybridised mimicry and axiorationality (Hobson and Seabrooke 2007) • Defiance occurs when actors resist elite coercion through unconcealed resistance activities • Mimetic challenge is a concealed type of resistance strategy and entails the adoption of the discourse and/or characteristics of the dominant to camouflage their resistance challenges to the dominant's legitimacy. The normative discourse of the dominant are appealed to (Hobson and Seabrooke 2007). Hybridised mimicry happens when the dominant's discourse is adopted and then filtered through cultural lenses to produce something new and hybridised within the receptor society (Hobson and Seabrooke 2007)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Axiorationality is used by actors when they reflect upon conventions and norms and the interests they inform. They then choose to act in ways that are in accordance with broader intersubjective understandings of what is socially legitimate. Actors oven operate in a rational manner, but their actions are also informed by norms and identities (Hobson and Seabrooke 2007)
Feminisms	Millett (1970), Mitchell (1974)	Interpretivist and critical	Anthropology, philosophy, international relations	• There are different forms of feminism (Pettman 1999) • Feminism can be regarded as a political project to change the inequality, exploitation or oppression of women (Pettman 1999) and how the institutions, processes and practices through which women are subordinated by men are maintained (Heywood 1999) • Feminists reject the view that politics is located in narrowly confined public activities and institutions, such as governments and elections; sexual relations are also political. For feminists sexual politics is patriarchy, which is a form of oppression and exploitation to which women are subjected. Gender is

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				socially imposed and therefore a social construct, which is based on stereotypes of feminine and masculine behaviour and social roles. Gender is therefore not a biological difference between men and women (Heywood 1999) • Liberal feminists seek an end to the exclusion of women from public office, power and employment. These feminists seek equal rights of women in the military, including in combat. If women are protected it will invariably keep them from power and they will remain dependent on men as their full claim to citizenship, which is also understood as serving in the armed forces and fighting for one's country (Pettman 1999) • Radical feminists see women's subordination as universal that takes different forms at different times. For some radical feminists, women are a sex-class. This means that they are everywhere and systematically subjected to men's sex-right of claims to access to their bodies, children and labour. The main form of keeping women from power is through violence against women. Sexuality is a form of politics (Pettman 1999)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• For cultural feminists, women are seen as different from men in that women are more caring or nurturing and peaceable. Politics and environmental problems need the values of women to bring about change (Pettman 1999) • Feminist theories are critical of the so-called naturalistic explanations of sex and sexuality that premise that the social existence of women is based on some physiological fact. For feminists, the personal is political that are sometimes viewed as public (Butler 1988) • By empowering women and giving them equal rights could limit family size voluntarily. This will reduce population rates to economically sustainable levels. Women are also more prone to constructive and peaceful behaviour to conflictual issues (Viotti and Kauppi 1999) • Some feminists also link the creation of knowledge with gender. The claim that women's lives differ from that of men has consequences for the generation of knowledge. The western white dominant male's domination of science and

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				knowledge has produced knowledge which is not complete (or rather partial) and excludes or marginalises women (Hartsock 1983). In other words, the gender identity of those creating knowledge has an influence on the process of knowing and the transmission of such knowledge (Smith 1996)
Hydro-social contract theory	Turton and Ohlsson (1999), Warner (2000), Turton and Meissner (2002), Meissner and Turton (2003)	Positivist	International relations	• There are a number of societal transitions when it comes to the development and management of water resources (Warner 2000; Turton and Ohlsson 1999). The theory gives insights into how such management practices have originated (Meissner and Turton 2003). The transitions can lead to a number of social instabilities (Meissner and Turton 2003) • Social, economic, political and institutional changes are at times independent variables that can impact on hydrosocial transitions. Engineered solutions, the so-called hydraulic mission are a reaction to prevailing conditions of water scarcity brought about by either biophysical and/or societal changes. Droughts, population growth, industrialisation, large scale water

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				pollution (Turton and Meissner 2002) and constraints in water resources management (Martin-Carasco et al. 2013) can be responsible for such a change. This is the first transition, when water scarcity is encountered by a particular social entity (Turton and Meissner 2002) • The scarcity brings about adaptive behaviours that are the solutions to water scarcity. Such solutions include water restrictions during droughts, cloud seeding, changes in water policies, rain harvesting etc. Coping strategies are also the result (Turton and Ohlsson 1999). Water scarcity is the independent variable that brings about social changes • This first transition has the same characteristics as a Hobbesian-like contract where a bi-polar arrangement between government and society takes effect (Warner 2000). Power relations creeps into the domain of water resources management. The state and engineers take responsibility to supply society with water, granting the engineer a privileged position in society (Turton and Ohlsson 1999). The contract gives government a mandate to

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				assume and execute its responsibility, and acts as the foundation for the development of institutional arrangements such as government departments. The contract also indicates to the public what fair and legitimate practices is (e.g. sustainable development) (Turton and Ohlsson 1999) • Engineers become the 'discursive elite' and set in motion a sanctioned discourse. Politicians and engineers therefore dominate the first transition, with government as the custodian of water resources (Turton and Ohlsson 1999). The discursive elite determine the nature, form and content of the prevailing discourse, which is also known as the sanctioned discourse. This sanctioned discourse represents what may be said, who may say it and how it may be interpreted. This ultimately leads to the creation of dominant belief system or paradigm (Meissner and Turton 2003) • Social instability can be the outcome should the state not deliver on its promise; the state can either ignore society's pleas for water provision, due to capacity constraints or corruption, or supply water to only one part of the population (Turton and Ohlsson 1999)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• A second transition takes place when water deficits, in the face of engineering solutions, start to rear their heads (Turton and Meissner 2002). The result of this transition is a Lockean type of hydrosocial contract (Warner 2000), which is characterised by a triangular configuration between government, the public and interest groups or other elements in civil society, because of Locke's emphasis on civil society's role in politics, a triangular, as opposed to a bipolar (Hobbesian) • Two events are also important to consider within this transition and the context of adaptive behaviour. The first is that there is a cost in the implementation of engineering solutions. Government and local authorities find it increasingly difficult to finance water infrastructure programmes or there is no other source of water. Then a social conscience starts to surface and here civil society becomes prominent with the social conscience usually manifesting in the form of environmentalism. This psyche highlight the notion that supply-sided solutions are highly unbecoming the state. Such

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				solutions are environmentally damaging. The theory postulates that if this transition is not handled in a sound manner, it can cause social instabilities like political unrest and varying levels of civil disobedience (Turton and Ohlsson 1999). Interest groups, through lobbying activities, are major actors in this transition (Turton and Meissner 2002; Meissner and Turton 2003) • Interest groups mobilise support against water infrastructure projects, like large dams, and demand that water resources development becomes more sustainable. Following this, and because interest groups challenge the sanctioned discourse and demand alternatives to water resources management projects, they become new members of the discursive elite and the sanctioned discourse embraces principles of the sustainable utilisation of water (Turton and Ohlsson 1999; Meissner 2004) • A possible third transition in the hydrosocial contract theory can also be present. This occurs when interest groups enters into agreement with government entities, such as when they sign memoranda of understanding (Meissner and Turton 2003)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Interactive Governance (Governability)	Jentoft (2007), Jentoft and Chuenpagdee (2009), Kooiman (1999, 2008), Kooiman et al. (2008), Kooiman and Bavinck and Kooiman (2008), Kooiman and Bavinck (2013), Scholtens and Bavinck (2013)	Interpretivist	Marine Fisheries	• Societies are governed by a combination of efforts (Kooiman and Bavinck 2013) • The mixture of governance efforts is the result to ever growing diversity, dynamics and complexity as well as major concerns such as poverty and climate change (Kooiman and Bavinck 2013) • Governance is the collection of governing activities carried out by societal actors in response to public needs and visions (Kooiman and Bavinck 2013) • Governance is in general organised and routine and rarely harmonious but typically interactive (Kooiman and Bavinck 2013) • Interactive governance is the 'whole of interactions taken to solve societal problems and to create societal opportunities, including the formulation and application of principles guiding those interactions and care for institutions that enable them' (Kooiman and Bavinck 2005: 17) • Society is comprised of as large number of governing actors that are constrained or enabled by their surroundings (Kooiman and Bavinck 2013)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Actors are any social unit possessing agency or power of action, which includes individuals, associations, firms, governmental agencies and international organisations (Kooiman and Bavinck 2013) • A broad range of principles is the foundation of governance. None of which has primacy over the other (Kooiman and Bavinck 2013) • Governance, however, do contain normative elements, with the most important being interaction. Interaction is often more effective than 'going it alone' (Kooiman and Bavinck 2013) • Broad societal participation in governance is an expression of democracy which is a desirable state of affairs (Kooiman and Bavinck 2013) • Values, principles and goals are not fixed but are at the same time developed and expressed as actors engage in social-political exchange (Kooiman and Bavinck 2013)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Goals are not given but negotiated. Neither is these goals stable but varies according to the relative strength of the participants that come and go (Kooiman and Bavinck 2013) • The goals or plans are the outcome of interactive, experience-based learning (Kooiman and Bavinck 2013) • Governability 'is the capacity to bring about, organize and carry out governing interactions in the face of societal and natural diversity, complexity and dynamics in terms of elements, modes and orders of governance as attributes' (Kooiman 2008: 178) • Three main elements are at play in the governability project: the governors, the governed and all the external influences that impact on the system or entity that is being governed. These three variables add to varying degrees to governability. Acts of governance as well as external factors can have an impact on the degree of governability (Kooiman 2008) • The theory starts with societal activities or primary processes such as drawing water from a river, catching fish, irrigating a field or flushing a toilet. Such processes have

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				become more diverse, dynamic and complex and take place at different spatial and temporal scales both qualitatively and quantitatively (Kooiman 2008) • Diversity emphasises the specific and varying qualities of actors in a system-to-be-governed, its governing system and governing interactions. Diversity is the source of innovation and creation and also carries the potential of a system's destruction or disintegration (Kooiman 2008) • Dynamics deal with regularity and irregularity and hold the potential for change as well as disruptive consequences (Kooiman 2008) • Complexity deals with societal structures, interdependencies and interrelations and is a condition for combining interdependencies (Kooiman 2008) • Scale has to do with space and time and represents the level where one can see the combined effects of diversity, complexity and dynamics (Kooiman 2008) • It is the interactions and interrelationships among economic, social, biophysical and the host of other components of the system-to-be-governed that constitute the system as a whole (Kooiman 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Governability recognises three modes of governance: hierarchical governance, self-governance and co-governance (Kooiman 2003, 2008; Scholtens and Bavinck 2013) • Hierarchical governance is also the mode of governance that is visibly not functioning very well as ever increasing rules and regulations do not live up to their expectations. Co-governance, such as public-private partnerships and co-management of resources, are emerging constantly and are becoming more prominent, while self-governance is an area with little understanding, theoretically as well as politically and ideologically (Kooiman 2008) • The resilience of a system will depend, to varying degrees, not only on self-governance or co-governance or hierarchical governance, but a combination of all three in the face of complexity, dynamics, diversity and scale (Kooiman 2008) • It is here where governability moves away from the learning by doing or adaptive management (Kooiman 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Governance systems have a number of attributes: images, instruments and action. Images, instruments and actions are the three elements of interaction through which governors govern (Kooiman 2008) • Images are the sets of ideas where a governor wants to go (i.e. the assumptions about fundamental matters, vision, knowledge, facts, judgements, presuppositions, hypotheses, theories, convictions, ends and goals) • Instruments give the ideas substance and actions are needed to put the instruments at work. Instruments can be hard or soft and the choice of a certain instrument is not free; it is determined by positions in and views of society. Neither are instruments neutral. Their design, choice and application can lead to strife. Images relate to specific issues as well as the images of the relationship between society and nature and the role of government (Kooiman 2008) • Action is the implementation of policy according to certain guidelines as well as the mobilisation of actors to move into new and uncharted directions. Structural conditions can be more important than governing interactions (Kooiman 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Governability outlines three orders of governance: first- and second-order and meta-governance (Kooiman 2008) • Day to day affairs is what constitute first-order governance and exist where people and organisations interact to create opportunities and solving existing problems • Second-order governance is institutional arrangements within which first-order governance takes place • Meta-governance feeds, binds, and evaluates the entire governance exercise. 'In meta-governance, governors and the governed alike take each other's measure in formulating the norms by which they want to judge each other and the measuring process itself' (Kooiman 2008: 181)
Interest group corporatism	Schmitter (1983), Huggins and Turner (1997), Wilson (1990), Sellars (1997)	Positivist	Political science, comparative politics	• The theory places prime importance on the role of interest groups in society (Huggins and Turner 1997) and how governments interact with interest groups (Meissner 2004). The emphasis of corporatism is away from the assumption of absolute individualism in society and that collective representation, although a restricted one can also be part of society's structure (Carrasco 1991)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Interest groups are a central element in understanding politics and the processes surrounding interest group and government behaviour (Huggins and Turner 1997) • There is a need for the incorporation of specific interest groups into decision making processes. In this regard, economic and functional interest groups (e.g. labour unions) are as important as the governmental process and they have insider status into this process. Governments can benefit from the services and expertise of these interest groups. This means that political power is situated in the hands of a few interest groups (Smith 1993). There is not much lobbying from interest groups in the system because the personal ties between their leaders and government officials make this unnecessary (Wilson 1983) • There exist a tripartite relationship between labour, capital (business) and government in society, because of the insider status of certain interest groups (Heywood 1997; Sellars 1997)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Within such a system, the policy process is characterised by consultation and bargaining between the three groupings (Huggins and Turner 1997). Even so, government is at the top of the hierarchy (Sellars 1997) • Since there is this tripartite relationship, there is a hierarchy of interest groups in society (Heywood 1997) where economic and functional interest groups top this hierarchy • Government is therefore not a neutral moderator and actor when interacting with interest groups; it chooses which groups it will consult, and how and for what reason public policy should be implemented. This decision-making process is characterised by a top-down arrangement. There is therefore no level playing field on which interest groups compete. What is more, interest groups do not lobby government per se, they rather negotiate with it and in so doing exert an autonomous position in society (Huggins and Turner 1997; Sellars 1997)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• The policy process depends on political incentives and sanctions from government to ensure interest group cooperation for public purposes (Streeck and Kenworthy 2004) • Government decision are made and implemented after close consultation with these interest groups (Wilson 1990; Sadie 1998)
Interest group pluralism		Positivist	Political science, comparative politics	• The theory falls under the rubric of liberal pluralism, but is seen as a distinct theory under Political Science (Viotti and Kauppi 1999). It is the opposite of interest group corporatism • Interest groups are important vehicles to broaden citizen participation in the political process and give them representation in the process (Huggins and Turner 1997) • Power is widely dispersed among interest groups in society (Ball 1988). There are numerous interest groups that exert influence over government processes. Government is responsive to the interest groups' views, opinions and stances. Interest groups can therefore be successful in influencing policy outcomes because all

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				have insider status to the governmental process (Smith 1993; Moore and Roberts 1992). There is therefore almost perfect competition between interest groups and no single interest group or particular collection of interest groups dominate (Hague et al. 1992). This means that interest groups, have little or no statutory contact with governmental decision makers and operate from outside the institutional structure of government to influence policy through political lobbying (pressure) rather than to be directly involved in decision-making (Wilson 1983) • A balance of power exists between the various interest groups and the between those groups and the ruling elite (Davies 1996) • Interest groups establish themselves around common interests and mutual threats (Davies 1996). Any threat to society will produce interest groups that will respond to it or counteract the threat (Meissner 2004)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Individuals can belong to different interest groups and may advance a number of interests at the same time (Cummings and Wise 1971) • The state poses a disproportionate amount of resources, which is transformed into political power. Interest groups have a counter balancing influence on state power. Government practitioners react to the inputs coming from a wide variety of interest groups regarding certain issues and interests and attempt to strengthen their own power base accordingly. Interest groups can force the ruling elite to respond more effectively to a wide range of constituencies than a small group of influential individuals (Smith 1993; Berry 1997). Political power is therefore diluted throughout the domestic political system by interest groups • Society dominates the state. The state is a mere domain or arena of competition between various interest groups. Interest groups therefore compete with one another on a levelled playing field (Moore and Roberts 1992; Hague et al. 1998) • Interest groups determine and establish policy agendas and public interests, relative to society's organised interests (Viotti and Kauppi 1999)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Marxism	Karl Marx, Friedrich Engels, Vladimir Illich Lenin, Rosa Luxemburg, Mao Zedong, Antonio Gramsci	Positivist	Philosophy, political science, international relations, development studies, sociology	• Classical Marxism's cornerstone is the materialist conception of history that highlights the importance of economic life and the circumstances under which people produce and reproduce subsistence. The theory explains social, historical and cultural development in terms of material and class factors (Heywood 1999) • History is therefore central to the theory with history being seen as driven by dialectical processes with internal contradictions with each method of production that is reflected in class antagonisms (Heywood 1999). In other words, history is produced by productive forces and economic activities, with history operating through the class struggle over the distribution of social products (Gilpin 1987) • For instance, capitalism is technologically quite advanced of class societies. Capitalism will be overthrown in a revolution that will establish a classless, communist society (Heywood 1999). In a communist society scarcity is abolished and the system will be informed and reached by socialism that is not based on

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				profit motive and market forces (Brown 2002). Socialism is the end goal of Marxism (Gilpin 1987) • Marxism is the alternative to liberalism with its attack on individualism and the limited concern with civic and political rights. Liberalism is an ideology of the upper classes to legitimise capitalist class relations (Heywood 1999) • For contemporary Marxists, the driving forces behind politics are the class struggle and uneven development and they see history as dynamic and dialectic and not cyclical (Keohane 1983). There is no social harmony or a return to balance in society (Gilpin 1987) • For Marxists power is a crucial aspect in politics and in world politics, the theory sees periodically hegemonic powers dominating history. These powers wield unprecedented economic and military power (Keohane 1983) • Social relations are the function of particular socio-economic systems. Whether this system is capitalist, socialist or feudal, political, legal, ethical and religious ideas and institutions will be based on the nature of the system. These 'superstructures' justify and perpetuate the said socio-economic system (Stern 2000)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Modernity	Giddens (1990, 1991), Beck and Ritter (1992)	Positivist	Sociology	• Modernity arose from a number of revolutions that swept the world a couple of centuries ago, most notably the industrial revolution and the enlightenment (Adams 1993) • Modernity and the human progression go hand-in-hand with the modern modes of economic production. The nuclei of modernity are the city and the capitalist (money) economy (Ritzer 2000) • Modernity is described by Giddens (1990) as a juggernaut or a runaway engine that has enormous power that humans can control, to some extent, but something can also get out of hand. The juggernaut has more power than those creating and controlling it (Meissner 2004) • Modernity manifests itself in four institutions: (1) capitalism, (2) industrialism, (3) surveillance capabilities and (4) military power • Capitalism is characterised by commodity production, the private ownership of capital, propertyless wage labour and a class system derived from these characteristics. Capitalist modernity is also productivist because it creates fresh needs

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				for its own survival, using all available means from satisfying basic human needs to development assistance. Industrialism involves the use of power resources to produce commodities with industrialism embedded in all spheres of society from transportation systems, communication and domestic life (households) (Ritzer 2000; Haralambos and Holborn 2000; Comeliau 2002) • Surveillance capabilities are concerned with observing the activities and movements of citizens by the state (Giddens 1990) • Military power concerns the control of the means of violence, which is a central function of the state as well (Ritzer 2000) • Social movements develop in correspondence to these manifestations (Haralambos and Holborn 2000). For instance, labour movements and trade unions develop alongside capitalism, democratic and free speech movements parallel to surveillance capabilities and peace and ecological movements develop laterally with the military and industrial movements (Ritzer 2000)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Modernity can bring about both positive and negative consequences. Industrialisation can create better living standards, but at the same time create pollution of the natural environment. Military capabilities can ward off enemies, but can also lead to costly arms races. These risks are global in severity and not localised to small geographic areas (Ritzer 2000) • Modernity is not static, but dynamic, which is described by three factors distanciation, disembedding and reflexivity (Ritzer 2000). Time-space distanciation explains how social systems have become interdependent whereas they were previously distinct through remote or face-to-face interaction (Karsten 2003). Disembedding refers to our removal from time and space. In pre-modern societies we moved in space and time was experienced while one moved. In modern societies, the social space is not confined by the space in which one moves we can imagine what other spaces look like, even if we weren't there before. In other words, we also live in virtual space and virtual

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				time and those we never see or meet in this space has an impact on our lives (Giddens 1994). Reflexivity is those social practices that are examined all the time and that are reformed in the light of new information about those practices and thereby altering their characteristics (Giddens 1990). This examination produces constant change and a permanent state of uncertainty. Knowledge is constantly reviewed in this reflexive environment and it is always likely to be revised and therefore involve the reflective monitoring of actions (Haralambos and Holborn 2000) • Every aspect of the world can be reflected upon (Ritzer 2000; Meissner 2004)
Neo-Liberalism (Liberal-pluralism)	Dahl (1963), Doyle (1986), Hoffmann (1987), Russett (1990), Matthew and Zacher (1995), Brown et al. (1996),	Positivist	International relations, comparative politics, international political economy, democracy studies, philosophy	• Economic interdependence and democracy reduce (interstate) conflict (Oneal and Russett 1997) • States are not the only important actors in world politics (Viotti and Kauppi 1999) • Non-state entities, like international organizations, along with states are important actors in politics (Viotti and Kauppi 1999). Said differently, states are

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
	Moravcsik (1997), Ray (1998)			not the most important actors in world politics, with autonomous preferences also coming from non-state entities (Stone 1994; Nel 1999). These non-state entities are playing increasingly important roles in international affairs and influence states, or at least the governments of states in the determination of national interests (Viotti and Kauppi 1999) • States are not solid entities that can withstand outside influences, but are permeable entities (Heywood 1997) • The image of international relations as states pushing each other like billiard balls is incorrect. It more like a cobweb of relations with actors linked to each other in diverse ways. These linkages are based on highly complex and multiple interdependent relationships (Heywood 1997; Stern 2000) • To recognise non-state entities, liberal-pluralists replace sovereignty with autonomy as a settled norm (Heywood 1997) • States across the world are different in their composition, with different societal make ups and government apparatus (Stone 1994). States are therefore not like units

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• In this regard, states consist of citizens, interest groups, local authorities and government departments that are continuously competing with one another (Viotti and Kauppi 1999) • There is also no clear distinction between domestic affairs and international politics; these realms are interdependent with the one influencing the other. States or any other political institution represents some subset of domestic society (Moravcsik 1997) • Cooperation within the international system between liberal democratic states is quite normal because the present international order is perceived as liberal (Stone 1994)
Neo-Realism (Realism)	Carr (1939), Morgenthau (1948), Waltz (1959), Krasner (1976), Bull (1977), Gilpin (1981, 1987), Geldenhuys (1984),	Positivist	International relations, comparative politics, security studies, international political economy	• The state is the most important actor in the international system and it is a permanent institution in international and domestic politics (Dunne 1997; Kegley and Wittkopf 1997; Du Plessis 2000). The state's decision makers are afforded the same importance as states, but they are not as permanent as the state (Mansbach and Vasquez 1981)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
	Keohane (1983, 1986), Geldenhuys (1990), Huntington (1993), Nye (2004)			• States and the leaders governing states are rational and unitary actors when they are confronted with problems (Viotti and Kauppi 1999) • Non-state entities are of lesser importance because governments representing states are the only institutions that can formulate, implement and enforce laws (Viotti and Kauppi 1999). Because of this, realism focuses more on explaining the behaviour of states and pays less attention to individuals and transnational actors (Lynn-Jones 1999) • The international system is conflictual between states (Gilpin 1984; Archer 1992) • Power and security is a prime motivator in the motivations towards actions (Gilpin 1984; Archer 1992) • Power is unevenly distributed throughout the system (Gilpin 1981; Archer 1992) • Neo-realists, as opposed to realists, put some economic elements into their analyses (Archer 1992) • Apart from Keohane (1984), neo-realists believe that international organisations do not play such an important role as independent states in the shaping of the international system (Archer 1992)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Sovereignty must first be established before the non-state realm within states can start functioning. This means that power flows from the state to civil society and not the other way around (Dunne 1997) • States employ power to pursue national interests and achieve their goals (Brown 1997; Gilbert 1992) • The international system is anarchic of without any overarching sovereign or authority that can keep state behaviour in check and enforce laws. Because of this characteristic of the international system, states need individual power and exercise it to survive (Mastanduno et al. 1989; Lebow 1994; Brown 1997; Lynn-Jones 1999) • The results in states seeking to maximise their power to provide security within the international realm (Lynn-Jones 1999) and state survival must be the minimum aim of foreign policy and states are obliged to protect the physical, political as well as the cultural identity against the impositions by other states (Morgenthau 1978; Dougherty and Pfalzgraff 1990)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• A state's survival comes first and cannot be compromised (Kissinger 1977). This means that morality should not interfere with policies (Dunne 1997) • Because the international system is regarded as anarchic, self-help is one of the most important principles in world politics since other entities cannot guarantee or accomplish the state's national interest (Brown 1997; Kegley and Wittkopf 1997) • State policies are prioritised according to a fixed hierarchy of national interests, with the state's security at the top with the rest following (Berejikian and Dryzek 2000)
Normative Commensalism	Meissner (2004, 2005)	Interpretivist	International relations	• Individuals are the initiators of change in political arrangements. Private and public individuals cause tipping points or trigger events (Rosenau 2003b) that reconfigure the composition of actors that are actively involved in a system (Meissner 2005). The cause is not in concert with the state, is initiated voluntarily and in an ad hoc manner because individuals no longer has such strong loyalties toward the state, and this loyalty is more dispersed throughout society and are attached to various non-state entities too (Meissner 2005)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Interest groups along with the state and its governing apparatus are key drivers of politics. These two entities, consisting of individuals, create norms to direct political processes in both the domestic and international milieu (Meissner 2004, 2005). Here discourses play an important role and are action-orientated. An identity informs an actor's ideology, which influences the actors norm creating ability and this is how discourses come about (Meissner 2005) • Interest groups are more interested in influencing political processes than to confront each other in debates and try to dominate each other. The norm around which interest groups cluster is an inhibiting factor of conflict between a collectivity of interest groups and sustains the relationship between the interest groups. As such, interest groups are rational actors within political systems (Meissner 2005) • The political environment acts like a kind of laboratory for interest groups and states. They observe the environment, and the observations are transformed into different norms, which is then used for learning and influence (Meissner 2004, 2005)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Interest groups use the international environment as a resource pool in their efforts to lobby government policies. Interest groups use circumvention around state to gain access to the resource pool. Circumvention is a way through which relations are formed and expressed. The resource pool contains other states and interest groups that are willing to lend support, but also particular norms that the interest groups will use to influence policies. The resource poo also consists of the biophysical environment that provides clues to interest groups and states on how to develop arguments for or against actions that could potentially harm the environment. These clues are then translated into norms (Meissner 2005)
Political ecology or Green Politics		Interpretivist and critical/ opportunity creation	International relations	• The theory rejects that the state system and other global political structures can effectively respond to environmental problems. The solution, according to the theory, is a global political transformation rather than the design and re-design of institutional structures and arrangements to respond to environmental problems (Paterson 2001). Political ecology

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				acknowledges the increasing human production of the environment and the political forces controlling this production (Bryant and Bailey 1997; in Le Billon 2001). As such, political ecology is a radical critique of apolitical environmental research and practice (Le Billon 2001) and as such political ecology brings political debate to the science of ecology (Forsyth 2003). This means that change occurs in specific places as outcomes originating from the interaction between political and economic process at the local, national and international levels (Blaikie and Brookfield 1987; Rangan and Kull 2009) • Increased economic development through industrialisation damages the natural environment (Heywood 1997). During the production process of material goods, external costs are inflicted on society and the environment through environmental degradation (Toke 2000). Limits to growth go hand-in-hand with rapid economic and population expansion. These dynamics strain the earth's carrying capacity and resources that will soon reach its limits. This means that society can only grow to a limited extent (Pepper 1984; Hayward 1998; Eckersley 1992; Paterson 2001)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Development is anti-ecological because it undermines sustainable practices that create inequality through enclosure or when common spaces are turned into private property. Enclosure is a global phenomenon (Paterson 2001) • Sustainable development is rejected by political ecologists because they believe it is just another way for the ruling elite to co-opt environmentalism (Paterson 2001). Because of this and alienation from the environment through economic processes and the division of labour, far reaching changes to political and social institutions are needed to reverse alienation (Atkinson 1991) • Political ecologists are anti-anthropocentric in that humans are part of nature and as such humans are elements of a world that is composed of various mutual and related living and non-living entities. This is seen an ethically correct and crucial for human survival (Baradat 2000)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• To counteract this anthropocentrism of state action, political ecologists advance ecocentrism that acknowledges human and non-human interests (Naess 1973; Toke 2000). Because of this, political ecology embraces complexity thinking and rejects atomism • In order to take the political ecology agenda forward, the state's political power should be decentralised and centralised at the regional and global levels and to achieve this, human communities should be downscaled. Political ecology challenges globalization because it is only through diversity that ecocentric ethical spaces can emerge (Paterson 1996). Because of this, non-state actors are also afforded political power by political ecologists
Risk society	Beck and Ritter (1992), Giddens (1991), Beck (2007)	Positivist	Sociology	• Classical modernity was characterised by an industrial society, with the main distinction being the industrial revolution and its aftermath (Beck and Ritter 1992; Ritzer 2000) • The new modernity and its associated technologies are the characteristics of the risk society (Beck and Ritter 1992; Ritzer 2000)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• We are living in an industrial and risk society. In other words, we are in a transitional period between these two civilizations with the society in which people live having elements from both worlds (Beck and Ritter 1992; Ritzer 2000) • The industrial society is modernising and this modernisation of the industrial society is called reflexive modernity (Beck and Ritter 1992) • The modernity is the reason why individuals and citizens are operating more independently as society becomes more classless (Ritzer 2000) • Risks and their enhancement are central to the new modernity. These risks can be either reduced or redirected. Safety is of the essence and in this sense citizens look towards the defensive goal of being spared from danger. Wealth as well as the creation and accumulation thereof, is producing risks in modern society (Ritzer 2000). A risk is defined as a large negative impact on various environmental and social systems with a small probability of occurring (Björkman 1987)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• This creation of wealth fosters a culture of increased economic wealth, the disregard of natural resources as economic assets and the negative on the environment (Selin 1987). To be more precise, industrialism and the incessant accumulation of wealth produced by industrial processes are seen as the main sources of risks in modern society (Meissner 2004) • There is a connection between risks and class, with risks attaching to class patterns, but not in the way we think. Wealth is the norm at the top of the class structure, while risks are the norm at the bottom. With poverty come a large number of risks, while the wealthy (in terms of income, power or education) have the means at their disposal to purchase safety and freedom from risk (Beck and Ritter 1992; Ritzer 2000) • There are two types of risk: individual and collective. Individual risks are faced by individuals when they face the probability of getting hurt or even dying from a risk. Collective risks affect more than one individual, even large community or states as well as the human race are not spared (Selin 1987)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• The source for alleviating risk is found in modernity itself. The risks produced by modernisation also have the capacity to provide the reflexivity needed to reflect upon modernity and the risks it creates. Here people are the main reflexive agents, and especially those affected by risks. They observe their environment gather information on risks and the effects of risk upon them. Through observation citizens become experts on risks. In this sense they critically look at modernity's pace and the danger it holds for society (Ritzer 2000) • The advancement of knowledge is taking place outside government structures, not in opposition to it, but ignoring it (Beck and Ritter 1992). This has led to an erosion of the state and its main power base. This is called the unbinding of politics. Politics is no longer only the government's responsibility: individuals, interest groups, rural communities, science councils, industry and other private sector institutions play an increasingly larger role in politics (Meissner 2004)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Social constructivism	Wendt (1992), Klotz (1995), Katzenstein (1996), Adler (1997), Finnemore and Sikkink (1998, 2001), Price and Reus-Smit (1998), Ruggie (1998), Meissner (2004), Jacobs (2009)	Positivist/ Interpretivist	International relations, comparative politics, sociology	• Social constructivism attempts to explain and make sense of social relations by describing the construction of the socio-political world through human practice (Du Plessis 2000) • The theory argues that positivist theories have been exceedingly materialist and agent-centric. Positivists assume that International Relations is a product of agents (usually states), 'which are imbued with 'instrumental rationality'. This means that states seek their power or utility-maximising choices or interests, which is rejected by social constructivism (Hobson 2000) • States are constrained by social normative structures (Hobson 2000). The theory focuses attention on the core ideational elements of intersubjective beliefs (ideas, concepts, assumptions, and so on) that are widely shared by people (Jackson and Sørensen 2003) • State identities are constructed through norms, which define their interests. Norms have therefore an important function in that interests change as norms reconstruct identities leading to changes in state

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				policy. In short, norms channel states along certain socially dictated conduits of appropriate behaviour, which means that norms are autonomous. Contrariwise, positivism sees norms as intervening variables situated between the basic causal variable (power actors) and international results (Smith 1997; Price 1998; Du Plessis 2000; Hobson 2000) • Social constructivism treats the domestic and international spheres as two facets of a single social and political order. The theory is it is concerned with the dynamics of global change, especially the rise and possible decline of the state. Because of this, it focuses on the mutually constitutive relationship between the global order and the state (Reus-Smit 2001) • Transnational state actors, like interest groups, are believed to exist as a community of political engagement in international affairs. They have a meaningful impact through networks that teach governments what is appropriate to pursue in politics (Price 1998)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Norms create agents from individuals. This is done by giving them an opportunity to act upon the world. Agents use all means at their disposal to achieve their goals. Onuf (1998: 4) comments on this by saying that: 'These means include material features of the world. Because the world is a social place…rules make the world's material features into *resources* available for agents' use' • Relations and understandings between actors are developed through the medium of norms and practices. If norms were absent, power and action exercises would be meaningless. From this, an identity is defined by constitutive norms. This is done by specifying the actions that will lead other actors to realise that identity and respond to it appropriately (Hopf 2000) • Social constructivism also notes that agents and structures establish and give existence (constitutive) to each other. That said, individuals and states create societies that reflect their identities and interests. These societies then influence as well as shape the interests and identities of individuals and ultimately states. The societies and actors continue to evolve through this interactive process (Lebow 2008)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Strategic adaptive management or Adaptive management	Holling (1978), Rogers and Biggs (1999), Pahl-Wostl (2007b), Roux et al. (2009), Pollard and Du Toit (2008)	Positivist	Ecology, organizational studies	• A central premise of strategic adaptive management is that the knowledge of ecological systems is incomplete and elusive (Stankey et al. 2005) • Developing knowledge through scientific enquiry will always be limited due to resources and time. If these limitations are linked with certain contextual conditions, such as resource scarcity, new ways for understanding and learning becomes necessary and also inform practice (Stankey et al. 2005) • The policy process is implemented through the process of experimentation with learning from these experiments and experiences being the way to improve the formulation and implementation processes (Lee 1993) • Strategic adaptive management rests on both sound scientific reasoning that does not make action dependent on extensive studies and an implementing strategy to improve systematic evaluation of actions (Stankey et al. 2005) • Strategic adaptive management rests on the assumption that the resilience of socio-ecological systems is threatened.

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				The theory is a derivative of complexity theory, resilience and integrated management (Kingsford et al. 2011) • Past environmental resources management approaches have failed to deal with complexities and rapidly changing systems. To grapple with such changes and complexities learning by doing approaches or adaptive management approach is needed. In order to do this, natural resource systems need to be viewed as complex systems (Pollard and Du Toit 2008) • This strategy is seen as building rather than eroding resilience (Pollard and Cousins 2008) since co-learning and joint decision-making assist in producing mental models and advance the social dimension among various stakeholders (Kingsford et al. 2011) • Adaptive management requires having an initial adaptive planning process that is iteratively followed by an adaptive decision-making process. The adaptive planning process starts with all stakeholders agreeing on a 'desired state' that they should work towards. The reason

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				behind the need for such an agreement is to ensure that decision-making identifies and influences factors that can contribute to achieving a desired future condition, rather than choosing between immediate alternatives. The 'desired state' is made operational by a set of objectives with well-defined measures and targets. These measures and targets are subsequently monitored, and depending on the results of the monitoring, adaptation (changing the ways things are done) may be required (Roux et al. 2009) • Decisive foresight and purpose is built into the planning process and because of this, adaptive management is strategic. It is also adaptive because of its strong learning by doing elements and it is participatory since it involves stakeholder involvement at various levels of society (Roux et al. 2009) • Strategic adaptive management is a departure from the command and control management style and is rather inclusive, strategic, adaptive and creative (Rogers et al. 2000)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Strategic adaptive management is also based on the traditional policy formulation strategies with strategic adaptive management setting the desired ecological condition, which is a future state to move towards, as the first step. Then management options, through prediction (e.g. scenarios and modelling) should be devised. These options must also be tested for acceptability and then the appropriate option should be selected. Operationalisation is the third step, where management options are planned, implemented and indicators for the advancement measured. The last step is evaluation and learning in terms of the outputs it produce, through communication and the outcomes are evaluated and if necessary a review of steps one to three should take place (Kingsford et al. 2011) • Knowledge management is a central pillar that is necessary to create a partnership between science, management and society so that the common vision can be attained (Roux et al. 2009)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Adaptive management is an off-shoot of ecosystem management and notes that prediction of influencing drivers in ecosystems as well as system behaviour and responses are limited (Pahl-Wostl 2007a, b) • Management as learning takes centre stage in this theory. This manifest in the slogan: 'learning to manage by managing to learn'. This will increase the adaptive capacity of systems (Pahl-Wostl 2007b: 49) • Prediction and control are jettisoned in favour of a learning approach to management that must be adaptive and have the ability to change management practices based on new experiences and insights (Pahl-Wostl 2007b) • Even so, the scientific method is mimicked by highlighting uncertainties, specifying and evaluating hypotheses as well as setting up actions to test those hypotheses through field application (Stankey et al. 2005)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
Social learning and policy paradigms	Hall (1993)	Interpretivist	Comparative politics, policy studies, political economy, economy	• The most important factors that influence policy at a certain time are past policy and associated practices. Previous policy is the most important influence in the learning process surrounding policies (Hall 1993; Sacks 1980). Policy responds more to past policy than it does to social and economic conditions prevailing at a given time. Policy makers' interests and ideals are shaped by policy legacies or the meaningful reactions to preceding policies (Hall 1993) • The central agents or actors that push for policy change are the experts in a given issue field. They work either for the state or government departments or give the government advice. This advice is given from a privileged position at the intersection between the bureaucratic apparatus and the epistemic communities. Politicians do not play the most important role in social learning. Instead, it is the officials or experts who specialise in a particular field that is more important (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• The capacity of the state to act autonomously from social pressures is emphasised by the theory (Hall 1993). Socio-economic development, elections, political parties and organised interest groups do not play a 'primary' role in the policy process. Elites have a great influence over the process (Heclo 1974). Social learning reveals state autonomy from societal pressures when formulating policy objectives (Sacks 1980) • Learning takes place when individuals accumulate new information. This information includes that based on past experience. Individuals then apply the new information to their succeeding actions. Social learning is therefore a deliberate attempt to adjust the goals or techniques of policy in response to past experience and new information. Learning shows when policy changes become visible because of such a process (Hall 1993) • We should note that the learning process takes different forms. Such different forms will depend on the types of changes in policy that are involved (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• To disaggregate the concept social learning we need to consider three variables in the policymaking process. The first variable is the overarching goals that guide policy in a particular issue arena. The second variable is the techniques or policy instruments that are employed to attain the goals. The third variable is the precise settings of these instruments (Hall 1993) • If, for instance, the policy's goal is to bring about equity in the South African water sector, the chosen instrument might be a reallocation of water to those who do not have access to water resources. The goal's setting would be the volume of water at which the benefit is set (Hall 1993) • It then becomes important to distinguish the learning process associated with a simple change in the volume of water from that associated with potentially more radical transformations in the basic instruments of policy or its overarching goals (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• Based on these distinctions, there are three types of change in policy (Hall 1993) • The first type of change entails the levels or settings of the basic instrument in light of past experience and future projections. The overall goal of the policy's instrument remains the same. This is first order change (Hall 1993) • The policy instruments and their settings are changed in response to past experience although the overall goals of policy remain the same. This reflects second order change (Hall 1993) • Third order change happens when there is a radical alteration from one mode of policy development and formulation to another. That said, change takes place in all three components of policy: the instrument settings, the instruments themselves as well as the hierarchies behind the policy. This happens rarely and is an outflow of reflection on past experience (Hall 1993) • Ideas are central to policymaking (Hall 1993). In this regard, deliberation of public policy occurs within a realm of discourse. Policies do not fall out of the

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				sky they are formulated with some system of ideas and standards which is comprehensible and plausible to the involved actors (Anderson 1978; Hall 1993) • Practitioners utilise a framework of ideas and standards that specify the goals of policy and the types of instruments that are applicable to get to the goals and the nature of the problems practitioners try to address (Hall 1993) • Such a framework is embedded in the terminology through which practitioners communicate with each other about their work. The framework is influential because it is taken for granted and unamenable to scrutiny as a whole (Hall 1993) • The framework is called a policy paradigm (Hall 1993) • Once ideas associated with some actor or set of actors are adapted to the organization of a policy issue, the ideas get institutionalised into the procedures of an entity and formalised as a synthesis of some sort in standard texts around the issue (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• The ideas then specified the nature of the issue's domain, how it needs to be observed, which goals are attainable through policy, and what instruments should be used to attain them. The ideas are the prism through which practitioners see the domain as well as their within it (Hall 1993) • Policy paradigms are much like the scientific paradigms that Thomas Kuhn had identified (Hall 1993) • Through this analogy a number of hypotheses are possible (Hall 1993). First and second order change can be seen as 'normal policymaking'. It is normal policy making because of the process that adjusts policy without challenging the overall terms of a given policy paradigm, much like normal science (Hall 1993) • Third order change, on the other hand, entails radical changes in the overarching terms of policy discourse associated with a paradigm shift. Third order change is a disjunctive process associated with periodic discontinuities in policy changes preserve the broader contours of policy (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• It should be clear that first and second order changes do not automatically lead to third order changes (Hall 1993) • The nature of first order change is that of incremental change, satisficing and routinized decision making that are normally associated with policy making. Second order change of new policy instruments can move in the direction of strategic action. Third order change is more problematic (Hall 1993) • To explain this process, one must start with the nature and conceptualisation of paradigms. Paradigms are never fully commensurable or measurable by the same standard in scientific and technical terms. Each paradigm contains its own account of how the world facing practitioners face operates and each account is different. Because of this, it is often impossible for advocates of different paradigms to agree on a common data set against which a technical judgment in favour of one paradigm over another might be made. This has three important implications (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• 1. The process of paradigm replacement is more sociological than scientific. The views of experts are likely to be controversial, although the views may play a role. The choice between paradigms can therefore on rare occasions be made on scientific grounds only. The movement from one paradigm to another will then entail a set of judgements that have political tone. The outcome will depend on the arguments of competing factions and their positions within the institutional framework or structure. The outcomes will also depend on the ancillary resources they have at their disposal in the event of relevant conflicts as well as external factors affecting the power of one set of actors to impose the paradigm over others (Hall 1993) • 2. Authority issues are likely to be central to the policy paradigm change process. Since politicians are faced with conflicting expert opinions, they will b = have to decide whom to regard as authoritative, especially when it comes to issues of technical complexity. The policy community will become embroiled in a

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				contest for authority over the issues at hand. That said, the shift from one paradigm to another could be preceded by significant shifts in the centre of authority over the policy (Hall 1993) • 3. Policy experimentation and policy failure play an important role in the dynamism from one paradigm to another. Anomalies can threaten a policy paradigm. Such anomalies can be in the form of developments not fully comprehensible and puzzles within the terms of the paradigm. As anomalies appear, ad hoc attempts are make to stretch the terms of the paradigm to cover them. Even so, this gradually undermines the intellectual coherence and precision of the original paradigm. Policymakers can also deal with such anomalies through experimentation to adjust the existing policy lines. However, if the policy paradigm cannot deal with the developments, the experiments are likely to fail that gradually result in policy failures undermining the authority of the paradigm and its advocates further (Hall 1993)

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Theory	Proponents	Interpretivist (critical)/ positivist	Disciplines	Premises
				• So, policy paradigm shifts entails the accumulation of anomalies, experimentation with new forms of policy as well as policy failures. These facilitate a shift in the locus of authority over policy and initiate a wider contest between competing paradigms (Hall 1993) • Such a contest is not confined to state boundaries and can flow into the broader political arena. The contest ends when the proponents of the new paradigm secure an authoritative position in the policymaking process and are able to reorganise the standard operating procedures and organisations of the policy process and in that way institutionalise the new paradigm (Hall 1993)

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