

Towards Developing a Social Science Research Agenda for the South African Water Sector

Report to the
Water Research Commission

by

Victor Munnik and Jane Burt

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Water Research Commission
Private Bag X03
GEZINA, 0031

orders@wrc.org.za or download from www.wrc.org.za

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“We are creatures of water, dependent not only on ingesting water daily, even hourly, to keep the flow of life through our own bodies, but also on safeguarding the flow of water through the structure of the societies we have built, and through the biosphere making up our only basic life-support system.”

Leif Ohlson, 1995

“The list of human activities and their impact on the water systems of the planet are long and important. We have accelerated major processes (e.g. erosion, nitrogen applied to the landmass) while decelerating others (e.g. loss in delivery of river water and sediments to the world’s ocean). In our quest for human security we have harnessed enormous amounts of fossil energy, dammed major riverways, destroyed aquatic ecosystems and their resident biota, and altered the Earth’s climatology, chemistry, snow cover, permafrost, sea ice extent, glacial ice extent, ocean volume –all elements of the hydrological cycle.”

Water in the Anthropocene, Global Water News, No 12, October 2012

“We need an epistemology that recognises social dimensions of knowledge, but also an ontology that asserts the reality of the material dimension of the problems.”

Cornell and Parker, 2010: 31

“South Africa is the first country in the world in which water is seen as a tool in the transformation of society towards social and environmental justice.”

Schreiner, Van Koppen and Khumbane 2002: 127

Executive Summary

In response to a growing recognition among South African water researchers of the need to deal with social problems in the water sector through robust social science theories and methodologies, a short WRC consultancy project (K8.1204.1) was undertaken to explore:

1. The contribution that social research could make to solving urgent water problems and strengthening the water research sector.
2. The capacity and appetite for social research into water in South Africa.
3. The response from social researchers to developing a more coherent community of practice around social research into water.
4. Issues of concern to social researchers in water.

The project consisted of:

1. A discussion paper which was circulated to all participants.
2. A survey of the capacity in research institutions to undertake social research on water, based on self-reporting.
3. A survey of attitudes towards social research in the water sector.
4. A workshop bringing together mainly social scientists, but also natural scientists engaged in or interested in interdisciplinary work.

Ten reasons for integrating the social sciences into water research

Based on key learning moments and historical shifts that have led to a questioning of water resource management practice, ten arguments for integrating the social sciences into water research can be made. They are:

1. Water systems are open systems.
2. Ecosystems and human social structures can no longer be viewed as separate.
3. Changing the way we manage water is a social challenge.
4. Water challenges pose interdisciplinary questions.
5. Social research is needed because of the complexity of many water challenges.
6. Learning and water management can no longer be viewed as separate processes.
7. Understanding history is necessary to deal with current water challenges.
8. South Africa's democracy project informs South African water research.
9. South Africa is a rich social laboratory that can contribute lessons internationally.
10. Current WRC research shows the need for and potential of social research.

What is social research, and what is interdisciplinarity?

The report explores what is meant by social research and introduces a synthetic, interdisciplinary framework for water research that side-steps the 'hard' and 'soft' science debate by demonstrating how different disciplines help us understand different layers of reality when dealing with complex challenges.

It is important to make some distinctions between what we mean by *social research*, *social science* and *social outcome*.

Social research: Social research can draw on a variety of social science methodologies and/or science-based methodologies. Although the methods that may be used to answer social questions may draw from a variety of disciplines, the way social questions are framed, depends on an epistemological position. This is why in the social sciences it is important to be clear about the how your questions are theoretically framed if they are to be engaged with, with rigour (See below). Social research does not only ask 'how to?' questions such as "how can we provide people with information about their water?" but will question the process of how things are done (social processes) such as "Will providing people with information necessarily change behavior?", "What inhibits people's ability to participate in democratic processes?"

Social science research: Research within social science disciplines that draw on particular social science epistemologies (such as interpretivist or critical theory) and methodologies (such as phenomenology, ethnography, action research, discourse analysis) and methods (such as participant observation, interviews, focus groups, document analysis).

Social outcome: Research that aims to have a social outcome. Most science-based studies will have as an objective a social outcome. For example, clean water for rural communities. This kind of study may be looking at a particular technology for cleaning water in rural areas and therefore is research with a social outcome. Research that has a social outcome does not necessarily help us understand social processes and how these affect our ability to manage, protect and allocate water for the benefit of all.

Collaborations between different disciplines can produce a rich, multifaceted and informative view of social dynamics in the water sector. The social sciences have developed a range of methods and approaches to describe and research human society. These include dealing with the challenge that much of social research is a negotiation between the researcher and the researched, not a straightforward harvesting of information. Social scientists rely on the tools developed in each discipline to define the (social) objects they study, provide the language in which statements of these objects can be made, and explain the methods by which valid knowledge of these 'social objects' may be gained. Social objects can be entities like 'society', 'democracy'; 'development' and 'community' whose meaning is not always evident or easy to agree on but need to be stable enough for research to proceed.

The need for synthetic work can be embraced as an opportunity for developing research programmes that directly respond to the needs of the sector and as a way of progressing beyond the science/ social science debate. If a synthetic framework is adopted then different disciplines with their different approaches, methodologies, terminologies and methods give multiple viewpoints on

complex questions and address different aspects of the problem. The result is both integrated knowledge and the emancipation of knowledge as all knowledge systems are understood to contribute to the development of theory to guide action. The emergence of inter/trans-disciplinary work is relatively new and the research literature is amok with different terms, from cross-disciplinary to trans-disciplinary. For this report we have adopted Bhaskar’s (2010) definitions as described in the table below (adapted from Price, 2013). According to these definitions we will use the term interdisciplinary to describe the synthetic framing needed in the water sector.

Bhaskar’s Typology of Inter/trans-disciplinary approaches (from Price, 2013)

Typology	Definitions
Multidisciplinary	Pooling of the knowledge of the different disciplines, the final result being a series of reports pasted together, without any integrating synthesis. Same as Max-Neef’s definition (2005)
Interdisciplinarity	Synthetic interdisciplinary integration of the knowledges of different disciplines, using an integrating framework such as Bhaskar’s laminated system of seven layers of scale (2010) or Max-Neef’s ‘transdiscipline triangle (2005).
Transdisciplinarity	Involving the creative employment of models, analogies and insights from a variety of different fields and disciplines, e.g. Darwin’s theory of evolution required him to be <i>au fait</i> with more than one discipline, specifically biology, genetics, archeology, natural history and geology (his was an interdisciplinary knowledge – its geohistorical aspect pushing him at times outside the limit of empiricist science). Darwin’s theory was not just relevant to just one discipline, but to many disciplines and he used the analogy of ‘competition’ and ‘survival of the fittest’ in terms of humans to allow him to develop his understanding of ‘competition’ and ‘survival’ of the ‘fittest’ in terms of genetic material. Marx’s theories were also transdisciplinary and involved analogies, such as the analogy of Capital as ‘constantly sucking in living labour as its soul vampire-like’.
Cross-disciplinary	Involving the potential to empathise with, understand and employ the concepts of disciplines and fields other than one’s own. Similar in principle to, but broader than, Max Neef’s interdisciplinarity and identical to Max Neef’s weak transdisciplinarity.

Recognising the Anthropocene

Tracing the efforts of integrating social science into the global research programmes of earth systems science, provides an instructive example of how such processes work. It shows that scale and context matter. An interesting and persistent obstacle in the integration process – because it influences methodologies and the aggregation and integration of research questions and their findings – is that the social and natural sciences habitually “work at different scales”. Social science often works with the local, as human behaviour is often locally determined, because of local culture and institutions. This leads to the social sciences also facing the perennial question of how or indeed whether local studies can yield generalizable “laws” in the manner of the natural sciences. Scale effectively brings with it the question of differing and dynamic contexts – a problem arguably not faced by the physical sciences, but definitely confronting those studying the biosphere as well. These experiences also show that it is easier to integrate social science into a sector dominated by natural science if the integration is led by social scientists themselves, and it happens on a national, rather than international level. This suggested the community of practice approach which was followed in this project.

Again using a comparative approach, three instructive examples of the introduction of social research agendas in the water sector, and what the results were, are presented. The first is a South African example, the collection of hydropolitics work (Turton and Henwood, 2001); the second the creation of a research agenda around “water and culture” and “water and conflict” in the Mediterranean (El Moujabber et al., 2008), and the launch and publication over five years of the international online Journal Water Alternatives (2008 to 2012).

These three case studies suggest a number of directions in which South African social studies of water could develop. The Southern African hydropolitics collection illustrates the rich material available in the South African water sector, the diversity of viewpoints in the country, and the need for strong theoretical frameworks to understand its history and dynamics. That integration is still in its early stages, and still provides space for serious work in South Africa. The Mediterranean case studies show that alternative frameworks – in this case a framework emerging from people’s relationship with water from the grassroots up in an area where this has long been established in popular culture – are available for thinking through how to conceptualise social science projects in the water sector. The movement-like and successful initiative of the Water Alternatives shows how a strong intellectual political project (strong enough to be expressed in a manifesto) can attract creativity and productivity from social scientists in the water sector.

South Africa as a troubled but rich research area

South Africa’s history makes it a challenging but also very rich research area. As could be expected in a rapidly transforming society with a troubled and highly unequal past, the momentum of past arrangements in South Africa still intrude on the present, while the new democratic space also brings with it different understandings and approaches, sometimes leading to robust debate and contestation.

1. Archaeological research shows that human settlement in the stone and iron ages was determined by the availability of water and rainfall.

2. Political economies of pre-colonial societies and states in Southern Africa were determined by access to natural resources, such as water. Anthropologists argue that where water was abundant, settlement patterns showed dispersion into households, and where it was scarce, large urban centres developed, with consequences for cultural patterns (Hammond-Tooke, 1993).
3. Colonial settlement led to dispossession of indigenous people from well-watered land, culminating in the 1913 Land Act and carrying forward into the delimitation of the bantustans.
4. The riparian right to water linked access to water to land ownership, thus intensifying water inequality (Swatuk, 2010).
5. The focus of government in water provision was agriculture, as witnessed by the early name for the Department of Water Affairs and Forestry (DWAF), "Department of Irrigation" and the 1912 water law (the Irrigation Law). The construction of dams like the Gariep and Vanderkloof (and many others) was primarily for irrigation.
6. The 1956 Water Act made provision for municipal and industrial water use.
7. Under apartheid, access to water was used as a means of creating legitimacy of unpopular governments in the "homelands" or "Bantustans" since the 1950s.
8. Pollution legislation lagged behind developments in other industrial societies, where the 1970s saw a flurry of water pollution legislation (Weale, 1992).
9. Payment for local government services, including water, became a focal point for political mobilisation against the apartheid government in the 1980s.
10. The 1992 drought revealed the devastating effects of inadequate water access in South Africa's rural areas, particularly the "homelands".
11. Policy and legislation since 1994 set out to systematically correct the above problems, in an ongoing process to which this research strategy intends to contribute. Important recent documents include the Water Resource Management Strategy and the Strategic Framework for Water Services (DWAF, 2003). The framework consolidates strategies to decentralise water services to local government, and ensure that a participatory, regulatory framework can develop. It points out that the water sector in South Africa has set itself targets in excess of the Millennium Development Goals. A current process of water allocation reform as well as a longer-term transfer of water allocation function to catchment management agencies are systematic ways of tackling the issue of unequal access to raw water.
12. South Africa has inherited an extensive, well-developed and well-organised water sector with cutting edge engineering and other technological skills. The sector wide approach has strengthened this through institutions like the Water Sector Leadership Group, and the Masimbambane Programme. The WRC, with its mandate of dealing with the challenges of water scarcity through developing knowledge, has played a big part in this, but other initiatives like the Water Institute of South Africa, various university departments, consulting

firms, people in government and non-governmental organisations (NGOs) have also provided a strong base for the water sector.

For social researchers, this history should serve as an inspiration to contribute to the further development of the sector through research – and a rich source of empirical material.

Scan of the capacity for social research in the South African water sector

The project undertook a survey of individuals working as social researchers in the water sector, and a scan of water research institutions was undertaken in order to understand the approaches of water research institutions to social research, and their capacity for social science research into water.

The survey of individual researchers confirmed the need for more support to social and interdisciplinary research. It confirmed that many social scientists enjoy and benefit from interdisciplinary research. It also expressed confidence in the importance of social theory and social methodologies in the formulation of research questions. It is clear from the survey that there is some frustration with the role the social sciences play in the sector currently.

The respondents overwhelmingly pointed out the importance of the WRC and specialized funding for water research. They were generally impressed with the quality of the natural science and engineering based research in the WRC. A striking feature was the emphasis on practical usefulness of research, allied with a parallel emphasis on empowering communities to understand and monitor service delivery and water resources. However, there was much criticism of how much the research is used in practical ways. The examples of work by the respondents in this small sample indicated that there is already a sizeable production of social research.

The institutional scan included universities, and private and parastatal research institutions. It was accompanied by a survey of individual researchers working in some of these institutions, to elicit their views on the current state of social and interdisciplinary research, and research priorities. The process also served to identify participants for the national workshop in August 2013.

The scan showed that there are many water institutes, one or more than one at every university. Where they do not exist, universities are considering creating them. They all do interdisciplinary work (some are transdisciplinary, while some are multidisciplinary), and most express an interest in intensifying that. Natural science and engineering still seem to dominate these institutes. The institutes emphasise the need to and their intentions to work with concrete problems and find solutions to them. They also emphasise working with stakeholders and communities. These declarations point to an increasing need for social science.

It is also clear that the applied social sciences – law and economics foremost among them – are important. The scan as well as individual interviews however also revealed that the basic social sciences like sociology, history, philosophy, anthropology and geography contain individuals with an intense and growing interest in water. Often this interest is closely aligned to a general interest in “sustainability”.

It is noticeable that parastatals, consultancies and NGOs also contribute to social research.

Workshop of social and interdisciplinary water researchers

The workshop “Towards a social and interdisciplinary research agenda for the water sector in South Africa” in Kempton Park on 1 and 2 August 2013 was the final step in the project to encourage the participation of social science researchers in the work of the WRC and the water sector. The workshop aim was to move towards developing a social science research agenda for the water sector, while providing an opportunity for participants to explore issues around social research in the water sector that are important to them.

The workshop was a first meeting of its kind and very well received amongst social researchers. Many expressed their excitement at finding a common space in which to discuss social water research issues. There was an enthusiasm for bringing disparate social researchers together in forums like the workshop. This was captured in the idea of a community of practice – researchers that come together in workshops, local meetings, and virtually via the internet – to pursue topics of mutual interest, including research strategy, funding, publications and collaboration. It was a clear that this research community, however it is organized, will be a vital component for developing and implementing a social and interdisciplinary research agenda for the WRC, and more broadly in the water sector.

Conclusions and recommendations

The workshop developed an extensive agenda which should be addressed in a follow up process. The following needs were expressed by the group:

- Supporting and promoting social science in a natural science dominated sector.
- Achieving better interdisciplinary co-operation between social and natural scientists.
- Developing an understanding of the role of social scientists by documenting the practices of social science in the water sector.
- Supporting up and coming social scientists.
- Motivating for and developing assessment and funding frameworks that are in line with social science approaches.
- Dialogue with funding bodies to encourage a better understanding of social science research in terms of motivation, focus, aim and methodology.
- Supporting and developing strong social theory and practice in the sector.

Specific recommendations from participants were:

- To build a community of practice of social scientists.
- To use this community as platform to nurture the development of high quality and socially relevant social science practice in the water sector.
- To discuss and share methodologies and approaches.
- To plan and undertake collaborative projects.
- To encourage the WRC to rework its funding framework and research support and assessment process to be more in line with the needs of social science research and social science methodologies, including action research.

The project has been but a first phase in exploring the need for and potential of social research in the water sector. It showed that social scientists are prepared to work together to enhance the contribution that social science can make to the water sector in South Africa – in solving water problems through social research, and in growing the capacity of South African researchers and research institutions to undertake influential social research in the water sector.

Reference group members:

Dr Inga Jacobs	Water Research Commission, Chairperson
Karin Nortje	CSIR
Dr Richard Meissner	CSIR
Prof Johann Tempelhoff	North-West University
Dr Henk Coetzee	Council for Geoscience
Prof Heila Lotz-Sisitka	Rhodes University
Dr Jo Burgess	Water Research Commission
Dr Barbara van Koppen	IWMI
Dr Kevin Winter	University of Cape Town

TABLE OF CONTENTS

Executive Summary.....	V
Chapter 1: The need to understand social dynamics in the South African water sector	1
1.1 The limits of natural science and engineering.....	1
1.2 Social science, evidence based policy and public knowledge	2
1.3 A community of practice approach	4
1.4 This report	7
Chapter 2: Why integrate social science research in the water sector in SA?	9
2.1 Water systems are open systems.....	9
2.2 Ecosystems and human social structures can no longer be viewed as separate	9
2.3 Changing the way we manage water is a social challenge	10
2.4 Water challenges pose interdisciplinary questions.....	11
2.5 Social research is needed because of the complexity of many water challenges.....	11
2.6 Learning and water management can no longer be viewed as separate processes.....	11
2.7 Understanding history is necessary to deal with current water challenges	13
2.8 The Democracy project in South Africa informs SA water research	14
2.9 South Africa is a rich social laboratory that can contribute lessons internationally	14
2.10 Current WRC research show the need for and potential of social research.....	15
Chapter 3: What is social research?.....	16
3.1 Overview of social science disciplines	16
3.2 Social science, social research and social outcomes	17
3.3 Useful concepts and skills from social research	21
3.4 Developing an interdisciplinary framework for water research programmes.....	22
3.5 Using a laminated system as an integrating framework for the water sector.....	26
3.6 Using the laminated system to understand and integrate research: the Kat River Catchment	28
Chapter 4: Recognizing the Anthropocene: the integration of social sciences into earth system sciences.....	30
4.1 Introduction.....	30
4.2 The process of integration.....	30
4.3 Scale and context.....	32
4.4 Easier integration on a national level, and led by social scientists themselves	33
4.5 Recognising the Anthropocene	34
Chapter 5: Hydropolitics in Southern Africa, water and conflict in the Mediterranean and the online journal Water Alternatives	37
5.1 Introduction.....	37
5.2 Developing hydropolitics as a discipline.....	37
5.3 Water culture and water conflict in the Mediterranean area.....	39

5.4 Water Alternatives.....	41
Chapter 6: The SA Water sector as a research area	44
6.1 The SA Water Sector seen as a laminated system.....	44
6.2 The importance of history in the SA water sector.....	48
Chapter 7: Water research institutions in South Africa.....	50
7.1 Methodology	50
7.2 Survey of individual researchers.....	51
7.3 Scan of capacity and interest in institutions.....	53
Chapter 8: A gathering of social and cross-disciplinary scientists	63
8.1 Introduction.....	63
8.2 Overview of topics of discussion	63
Chapter 9: In conclusion	66
References.....	68
Appendices.....	78
Appendix 1: The Amsterdam Declaration on Global Change	78
Appendix 2: Disciplinary travelogue of resilience and adaptive management.....	80
Appendix 3: Water Alternatives Manifesto.....	83
Appendix 4: Individual surveys: Perspectives from within social sciences in the water sector.....	85
Appendix 5: Workshop 1-2 August 2013.....	95
Appendix 6: Participants' interests in social research.....	127

Chapter 1: The need to understand social dynamics in the South African water sector

There is a growing recognition among South African water researchers, as there is worldwide, of the need to deal with social issues in the water sector through robust social science theories and methodologies, to bring these skills into multidisciplinary water research teams and to define a strategic social research agenda (Mollinga, 2008). The WRC Strategic Plan 2013- 2017 has as one of its main objectives a move towards a bigger role for social science (Naidoo, 2013). This role is commonly seen as one of integration of social sciences into multidisciplinary work. According to the WRC's Ms Eiman Karar: "Emerging water problems in South Africa ...have resulted in a need for crossdisciplinarity, a transdisciplinary approach in problem formulation, better communication and dialogue between different disciplines, including shared terminologies, and greater participation from the humanities" (Karar, 2012).

In response, a short WRC consultancy project was undertaken to explore

1. The contribution that social research could make to solving urgent water problems and strengthening the water research sector
2. The capacity and appetite for social research into water in South Africa
3. The response from social researchers to developing a more coherent community of practice around social research into water
4. Issues of concern to social researchers in water.

The project consisted of

1. A discussion paper which was circulated to all participants
2. A survey of the capacity in research institutions to undertake social research on water, based on self-reporting
3. A survey of attitudes towards social research in the water sector
4. A workshop bringing together mainly social scientists, but also natural scientists engaged in or interested in interdisciplinary work.

1.1 The limits of natural science and engineering

Up to now, the water sector has been dominated by engineers and scientists as key decision makers. Their role is undoubtedly important as water is engineered and needs to be understood through the natural sciences. However, there is increased understanding that water decisions are not only about getting water to people but also about sustaining the resource and addressing social justice issues and the urgent need for change in society towards more sustainable and equitable practices. Social research also becomes relevant with the growing realisation of the complexity of many of the problems that we face today. Natural science can help us understand a system, and the problems within a system, but it does not provide us with ways to change practice. What is needed now is to develop understandings of complex social systems: how we learn within these systems, and more

importantly, how we change towards more sustainable practice. Social science disciplines can offer the methodologies and approaches needed for this kind of analysis.

This growing need for social science research is not only a South African, but a worldwide phenomenon, as the editors of an interdisciplinary journal on water, politics and development Water Alternatives, observe:

"Water problems are often taken as technical issues, subject to rationalization, optimization and best addressed by expert knowledge. Yet, in the past three decades water issues have proved to be highly divisive and have generated heated debates. Engineer-centered approaches have been challenged or paralleled by concerns for the role of social organization, institutions, power structures and, more generally, politics; economists have assumed an increasingly prominent role in stressing the significance of demand management and economic efficiency; environmentalists have been active in introducing a more holistic view of ecosystems, underlining the importance of water for the environment and human health; social activists have vied for framing access to water as a human right." (Manifesto, 2008, http://www.water-alternatives.org/index.php?option=com_content&task=view&id=12&Itemid=26 ref)

A 2010 seminar on water research at MIT concluded that:

"Solving the issues involved in providing enough clean water for the world calls on a wide spectrum of academic research and expertise, and interdisciplinary collaborations among the humanities, social science, architecture and planning, science, management, and engineering disciplines" (<http://web.mit.edu/newsoffice/2010/global-water-issues.html>).

The Social Science Research Council (SSRC) in the United States has been explicitly encouraging social research since 1923. It reasons that:

"Justice, prosperity, and democracy all require better understanding of complex social, cultural, economic, and political processes and committed to the idea that social science can produce necessary knowledge for citizens to understand their societies and necessary for policymakers to decide on crucial questions" (<http://www.ssrc.org/about/>).

1.2 Social science, evidence based policy and public knowledge

Most research in the water sector is undertaken with the expectation that it can solve problems in the real world. WRC research is publically funded (from a levy on water use) and as a result "the WRC provides and funds applied knowledge and water-related innovation for the improvement of the lives of the citizens who help fund the research to start with" (WRC, undated: 4). The purpose for funding research is because of a belief that research has the ability to answer urgent questions that are often driven by the need to make sound policy decisions.

Good policy interventions rely on good theory. Because successful interventions are very sensitive to context, the policy question should not be a general “best practice” regardless of context, but rather “What works for whom in what circumstances?” (Tilley, 2000). Other social scientists also question the idea of “best practice” with its assumptions that “success stories” can easily be transferred from one context to another and cautions against the easy use of models (Clever and Franks, 2008).

The reflexivity of the social sciences (see below in 3.3) includes reflecting on the reasons for doing research and how research is taken up. A first step is to recognize that there are differences between the agendas of researchers – who often increase uncertainty and questions raised as they build up understandings of important social mechanisms in the water sector – and policy and decision makers, who require succinct and practical advice and view uncertainty as a problem, as illustrated in Table 1 below (Clever and Franks, 2008).

Figure 1: Research for knowledge, policy and practice. From Cleaver and Franks, 2008.

	Research for		
	Knowledge	Policy	Practice
Scope	Defined by researchers	Defined by policy makers	Defined by users
Focus	Improved understanding of the world around us	Evidence of outcomes	Guidance for interventions
Timescale	Long-term, indeterminate	Medium-term, continuing	Short-term, bounded
Type of data and presentation of results	Intensive or extensive empirical research with findings generalised to theoretical propositions and to raising further questions. Uncertainty accommodated	Generalised, focus on 'success stories', 'best practices' with lessons for 'scaling up' and 'scaling out'. Certainty of linkages (inputs and outputs) required.	Specific and localised, often presented as tools or checklists.
Audience	Academics, intellectuals	Policy makers, politicians	Practitioners

The influential public sociologist Michael Burawoy has focused on the question of how and for whom social researchers produce knowledge. He argues that researchers produce four types of knowledge. The first is professional and dominated by career (often academic) rewards, which is generally inward-looking and focused on peers in the academe. Policy knowledge is “instrumental” in that it responds to the needs of a client, mostly government, whose first interest may be instrumental in the sense of social engineering. Critical knowledge engages the assumptions and value systems behind research questions and projects with an emancipatory agenda. Public knowledge – which Burawoy argues for – sees as its first responsibility to develop knowledge for the public good, and to share that knowledge with citizens in an empowering way.

Figure 2: Research for professional, policy, critical or public interest reasons (Burawoy, 2005)

	Academic audience	Extra-academic audience
Instrumental knowledge	<i>Professional sociology</i>	<i>Policy sociology</i>
Knowledge	Theoretical/empirical	Concrete
Truth	Correspondence	Pragmatic
Legitimacy	Scientific norms	Effectiveness
Accountability	Peers	Clients/Patrons
Pathology	Self-referentiality	Servility
Politics	Professional self-interest	Policy intervention
Reflexive knowledge	<i>Critical Sociology</i>	<i>Public Sociology</i>
Knowledge	Foundational	Communicative
Truth	Normative	Consensus
Legitimacy	Moral vision	Relevance
Accountability	Critical intellectuals	Designated publics
Pathology	Dogmatism	Faddishness
Politics	Internal debate	Public dialogue

Source: Burawoy (2005a); also in Burawoy (2005b)

Arguably, the foundational aspirations of the SA water sector and SA water policies after 1994 – aimed at transformation, participation, equity and sustainability – predispose South African research in the direction of public and critical research, and these orientations should exert a strong influence on policy research as well. (Pregs Govender, September 2013) Burawoy, who has a strong interest in and links with South African sociology, has observed that South Africa has a strong tradition of public sociology, involved with the public and with public political debate (Burawoy, 2007).

But finally, as Dirk Roux et al. (2006) argue, science for policy purposes (both natural and social) should be:

“in service of society, rather than purely of scholarship, and that good scientists will ask novel questions of, and seek objective approaches to, any unsolved problem. Similarly, potential adopters will know that if the solution to a problem does not exist it will require some novelty to find it, and if the approach is not scientifically objective, the solution will not stand up to either societal or scientific scrutiny.” (Roux et al., 2006).

1.3 A community of practice approach

The implicit trajectory of this project was to contribute towards the building of a community of practice of social researchers around the following:

- making more space (increased portfolio of work in in WRC and elsewhere) for social research in water in SA

- building more social research in water capacity through collaboration, which is the lifeblood of a community of practice
- solving social problems (or social aspects of water problems) through research contributions in a better way as an outcome of the above
- building interdisciplinary co-operation, so that social and natural scientists learn to work together and research itself moves to more interdisciplinary perspectives.

What could be expected from such a community of practice? The first impact should be research that is more adequate to the questions that need to be answered (because strong social theory and robust social methodologies are now used).

Second, as the status of social science in the water sector grows, as the result of robust theory and methodology – and of course the demonstrable better understanding and policy usefulness of research as a result – a broader range of questions will also come into view. More differentiated frameworks should emerge – that is researchers becoming more attuned to how knowledge is used – in the public interest, for policy makers, for citizens' empowerment – and in what forms, dialogues where and with whom, knowledge is shared and co-created. South African water research would become more sophisticated.

In the long run, an effective, well-functioning and self-renewing water research sector, held together by an ethos and practice of interdisciplinary work – and solidarity between institutions, e.g. between universities, but also universities and communities, and NGOs, etc. – would be an asset for building a participatory democracy, much as it helps solve and anticipate issues in the water sector. It is also a growth node for a knowledge economy (there is already international excellence in SA water sector research), which in turn can mean greater influence for democratic thinking in the region.

The assumption behind the project is that attracting more social researchers will

1. Enable socially based problems in the SA water sector to be better understood and thus better addressed.
2. Improve the quality of research and thus the strength and international competitiveness of this (already strong) sector of the SA knowledge economy.
3. Strengthen the institutions involved, e.g. universities, NGOs (and thus benefit communities). The assumption (important for this project) is that institutions would learn from and support each other.
4. Strengthen public understanding of water (because such understanding is generally better built by social science practitioners).
5. These objectives can be better achieved through collaboration between social scientists from different institutions.

These goals can all be seen as tasks that a Community of Practice (explored below) will normally take upon itself. It cannot be said that all this will be achieved, and certainly not within the scope of this project. However, the CoP framework is adopted for this scan because it provides a horizon of maximum success in this project, and the theory of CoP practice provides a useful checklist against which to plan and evaluate the workshop and the steps that follow.

Communities of practice can:

- **Connect people** who might not otherwise have the opportunity to interact, either as frequently or at all.
- **Provide a shared context** for people to communicate and share information, stories, and personal experiences in a way that builds understanding and insight.
- **Enable dialogue** between people who come together to explore new possibilities, solve challenging problems, and create new, mutually beneficial opportunities.
- **Stimulate learning** by serving as a vehicle for authentic communication, mentoring, coaching, and self-reflection.
- **Capture and diffuse existing knowledge** to help people improve their practice by providing a forum to identify solutions to common problems and a process to collect and evaluate best practices.
- **Introduce collaborative processes** to groups and organizations as well as between organizations to encourage the free flow of ideas and exchange of information.
- **Help people organize** around purposeful actions that deliver tangible results.
- **Generate new knowledge** to help people transform their practice to accommodate changes. (List taken from Cambridge et al., 2005).

But to achieve this, CoPs need to be carefully nurtured. An example of such nurturing of a CoP can be seen in the growth, supported by the WRC, in IWRM. It may be remarked that IWRM specifically has had great prestige and popularity among teachers, funders, researchers, practitioners, that is not necessarily the case for a more vague ideal of “giving social research in the water sector its proper place” (although for a strong exception see the Water Alternatives manifesto). Recognising that circumstances may be less encouraging and clear, the lessons from IWRM CoP should be brought to bear, while paying extra attention to comparatively “missing” elements.

This process of nurturing a CoP has been tested and found to require the following actions or phases:

- **Inquire:** Through a process of exploration and inquiry, identify the audience, purpose, goals, and vision for the community.
- **Design:** Define the activities, technologies, group processes, and roles that will support the community’s goals.

- **Prototype:** Pilot the community with a select group of key stakeholders to gain commitment, test assumptions, refine the strategy, and establish a success story.
- **Launch:** Roll out the community to a broader audience over a period of time in ways that engage newcomers and deliver immediate benefits.
- **Grow:** Engage members in collaborative learning and knowledge sharing activities, group projects, and networking events that meet individual, group, and organizational goals while creating an increasing cycle of participation and contribution.
- **Sustain:** Cultivate and assess the knowledge and “products” created by the community to inform new strategies, goals, activities, roles, technologies, and business models for the future (List taken from Cambridge et al., 2005).

The steps in this project would be classified as a process of inquiry, while the workshop and possible planning of a social research in water conference would be, optimistically, aimed at spanning the next three phases:

- **design** – co-design with an enthusiastic core group; leading up to (reference group activities) and during a workshop
- a **prototype or pilot event** (workshop) and possible follow up activities, such as project proposals in the 2013/14 and 2014/15 project cycles, involving co-operating consortia, and
- a **launch** in the form of a social and interdisciplinary research conference, possibly leading to publications.

Following the analysis of Defillippi et al. (2006) in their so-called “knowledge diamond”, there are interrelated links between four spaces of knowledge work:

1. the individual (researcher),
2. the industry or sector she works in,
3. the organisation that provides her with an institutional home (and a specific job description of duties),
4. as well as the community of practitioners (broadly random networks of professionals, but possibly consciously organized, for a purpose, as a community of practice).

Defillippi et al. illustrate that the dynamics of each space influence the others. So, the dynamics of different individual careers, organisations, positioning in the water sector, and also disciplinary allegiance (and boundaries) can be expected to all influence, positively and negatively, a potential CoP of social researchers in the water sector.

1.4 This report

The first six chapters (based on the original discussion paper) provide a conceptual and contextual background for the project. Chapter 2 gives a rationale for integrating the social sciences into water research based on key learning moments and historical shifts that have led to a questioning of water resource management practice.

Chapter 3 explores what is meant by social research and introduces a synthetic, interdisciplinary framework for water research that side steps the ‘hard’ and ‘soft’ science debate by demonstrating how different disciplines help us understand different layers of reality when dealing with complex challenges.

Chapters 4 and 5 present a series of case studies of social science in the water sector are given that demonstrate the usefulness of the kinds of questions social science calls us to ask and the methodologies that can be used to help us answer these questions. Firstly, the efforts of integrating social science into the global research programmes of earth systems science are traced, as the clearest example of how such processes work (Mooney et al., 2012; Cornell and Parker, 2010. Batisse, 2005). Again using a comparative approach, three instructive examples of the introduction of social research agendas in the water sector, and what the results were are presented. The first is a South African example, the collection of hydropolitics work (Turton and Henwood, 2001); the second the creation of a research agenda around “water and culture” and “water and conflict” in the Mediterranean (El Moujabber et al., 2008), and the launch and publication over five years of the international online Journal Water Alternatives (2008 to 2012). Chapter 6 discusses South Africa as a research area, pointing to some salient research questions and its potential to contribute to international research.

Chapter 7 gives the results of the scan of capacity for social research in the water sector, including a short summary of the survey of individuals (the detail is contained in appendix 4). Chapter 8 presents some conclusions from the workshop of social and interdisciplinary scientists in the water sector (a detailed report is included as appendix 5). Chapter 9 presents overall conclusions from this project.

Some material from the WRC Water Research Strategy for the Impact Area “Water and Society”, Project K8/637, has been incorporated into this report.

Chapter 2: Why integrate social science research in the water sector in SA?

There is a growing recognition that managing and conserving water is a complex activity. In the past the focus on conserving water was seen as an ecological concern. The complexity of social issues, challenges and concerns were either taken for granted, unrecognized or undertheorized. Management decisions and water research was the arena of engineers and natural scientists. This was for good reason as the focus of management was mostly concerned with supply and demand. Certain key learning moments and historical shifts led to a questioning and broadening of water management practice, conservation and research. These moments can be summarized as the following:

2.1 Water systems are open systems

The methodological approaches of the natural sciences assume that an artificial, closed system¹ can be created to research natural phenomena and that results from this research can be applied to the external world. The success of this approach works when clear boundaries can be set around a research object and variables separated out and controlled. Understanding the links between the ecological and the social and the scale of many of today's challenges questions the possibility of finding solutions if the system is researched as if it is a closed system – when we are in reality working with the challenges of an open system (Bhaskar, 2010, Max-Neef, 2005). When working with an open system, a very different approach to research is needed that relies on multiple knowledge systems (or interdisciplinary work), different research methodologies and a rigorous framework for synthesis.

2.2 Ecosystems and human social structures can no longer be viewed as separate

Managing ecosystems as if they are separate from society has been one cause of massive changes in natural systems that have often been devastating (Berkes and Folke, 1998; Folke 2006), for example the fires that overran the Yellowstone National Park in the United States in 1998 (Cundill, G & Rodela, R. 2011, 6) and the inability of management practices to address the problems of complex social systems and their interaction and influence in the biophysical world.

¹ What do we mean by reducing open systems to closed? When we research a closed system we rely wholly on the empirical that which we can see and measure. This excludes many phenomena that we cannot see or measure but nonetheless exist. An example of this would be how a particularly entrenched institutional culture can affect the way in which water, a tangible object, is managed. One cannot measure culture and yet the effects of an entrenched behavior pattern held within a social structure definitely has real effects on the way in which water is perceived and managed.

Basing our understanding of ecosystems on only a western scientific knowledge system has also led to local and indigenous practices, many that have been successful at balanced ecosystem management, being undermined, ignored or replaced (Berkes and Folke, 1998)². Understanding both the link between society and ecology and that we need to draw on multiple knowledge systems has led to a shift in the practice of environmental management and research towards practices that seek to manage complex and interdependent socio-ecological systems, and draw on different knowledge systems to do so. It was only as this understanding grew that the need was felt to deal with social problems in the water sector through robust social science theories and methodologies, to bring these skills into multidisciplinary water research teams and to define a strategic social research agenda (Mollinga, 2008; Karar, 2012).

Perhaps the best expression of the fusion of social, ecological and earth science questions is contained in the notion that we are living in the Anthropocene, the first geological age defined by the impact of human activity as the dominant force (Zalasiewicz et al., 2010). In the Anthropocene it is a question of survival to understand how “humans are changing the global water cycle, the associated biogeochemical cycles, and the biological components of the global water system and what are the social feedbacks arising from these changes?”³

2.3 Changing the way we manage water is a social challenge

Natural science may help us understand a system, and the problems within a system, but it does not necessarily provide us with ways to change practice. Over the centuries, the scientific method has been tried and tested. We know it is capable of producing sound empirical evidence on the functioning of the physical system and helping project future scenarios. Empirical knowledge is not something we lack. What we do lack is the knowledge and understanding of complex social systems at different levels: how we learn within these systems, and more importantly, how we change towards more sustainable practice⁴.

² There has been a backlash response were some researchers and practitioners have accepted local practices and knowledge as the best explanation/response without question. Recently, social science researchers have been looking at how something labeled as a local practice can have its own powerful influence and that people can often be motivated to use this to enhance power or benefit. One way around this is to adopt the view that all knowledge systems be seen as equally relevant and contextually specific and yet equally open to critique and challenge according to the logic of a given context and practice. In this situation, different knowledge systems are not oppositionalised but provide alternative explanations which may or may not be the best explanation/response to a contextual situation or problem. All explanations must be treated equally and stand up to logical enquiry.

³ These questions are at the heart of the GWSP Global Water System Project (GWSP) to take place in May 2013 in Bonn on the topic of “Water in the Anthropocene”. This topic is pursued further below.

⁴ In a report by the FAO (2000) the challenges of water scarcity are seen as a ‘social story.’ “It is the story of societies employing different means of adaptation over time, at different stages of scarcity, and in response to different perceptions of what constitutes the challenge to be met. The concept of “water scarcity” and its various degrees, as presented above, is widely accepted. The predominant focus in the interpretation of the phenomenon behind the concept is that water is becoming ever more scarce. An alternative analysis of the same phenomenon could be that it is not water that is becoming scarce, but the number of people and people’s wants that are becoming plenty. The distinction is not merely a matter of semantics, but may rather

2.4 Water challenges pose interdisciplinary questions

The great challenges we face today are not isolated to a single context or system but are often global, complex and messy. In the water sector we not only need to understand how the water system works, we also need to consider how human action and pressure impacts on the system. We need to improve our ability to predict future risks and explore social transformations and institutional structures and reform that support sustainable and equitable use. This need calls for collaboration and synthesis across multiple disciplines (ICSU, 2010). This is not an easy thing to do and requires skills often developed in the social sciences such as working with multiple perspectives, the importance of context, depth analysis, triangulation and integration.

2.5 Social research is needed because of the complexity of many water challenges

Nyambe *et al.* (2004) argue that many scientific disciplines have an often hidden assumption that scientific knowledge, such as defining the carrying capacity of a system, is working towards managing a stable system. This assumption equates stability with sustainability and sees the aim of research and implementation to reduce variability and restrict change. If natural systems are complex and unpredictable then attempts to manage for sustainability will be difficult. (Nyambe *et al.*, 2004). Folke (2006) argues that ecosystems have a number of points at which they may settle into relative stability. Even if this is so, managing complex systems and complex problems require different conceptual frameworks that take into account complexity and uncertainty both of ecological as well as social systems, for example a shift in a political regime. In this context we require both scientific and technical research as well as change-orientated research that generates and encourages social knowledge and the development of social learning processes (Hirsch Hadorn *et al.*, 2008). Social science approaches and methodologies assist in understanding complex social systems and what creates opportunity for change or inhibits it.

2.6 Learning and water management can no longer be viewed as separate processes

“As we come to grips with the complexity of the relationship between the environment and human development, it is no longer feasible to view learning and water management as two separate processes (Burt *et al.*, 2011). Learning is key to WRM for the following reasons:

- a) The democratic imperative: encouraging public knowledge and hence public debate and participation.

be seen as an illustration of the kind of problem being focused upon. Instead of discussing demography and human issues, the concern is about how to solve the “water problem” – as if water itself were to blame...

- b) Decentralisation (and the participatory implications of the National Water Act) of water management means that all actors need to be well informed in order to make responsible decisions.
- c) Changing practice to meet the challenges of sustainability in a changing world requires ongoing learning and reflection (e.g. the challenges of climate change).
- d) Working with different knowledge systems requires ongoing learning, debate and reflection on practice.

Over time and as WRM practice has changed there has been a growing acknowledgement of the importance of learning and a change in understanding of how we learn (or to put it in another way, how we know what we know). When the management approach to water was focused on infrastructure and demand, learning was understood to be a formal process of accumulating the required technical knowledge of the system in order to get the job done. With the change towards understanding water management as an integrated process that needs to take into consideration demand management, resource conservation and society (which includes issues that arise from the democratization of water management), the water sector has had to question its understanding of learning and how we learn to manage a complex socio-ecological system (Wals, A. 2007, Burt *et al.*, 2011). There is a realization that awareness building is not enough and that information does not always lead to knowing (although information is an important part of knowledge building). Social science and in particular the field of environmental learning has become core to incorporating learning processes that bring about change within complex situations and with complex problems. Part of this process is helping the water sector understand that learning is a social process that happens through doing and practice (or practicing) collectively rather than something that is done individually and happens in a separate compartment (such as an isolated training programme). This approach to learning is referred to as social learning or change-orientated learning and is core to developing sound water resource management practice.

Figure 3: Table of shifting practice in natural resource management and parallel changes in an understanding of what we learn and how we learn (drawn from Cundill, G *et al.*, 2012).

Management practice	Influential discourses	Who learns?	What we learn?	How we learn?
Command and control	Engineering	Managers	How to engineer system toward meeting demands and protecting resource.	Formal education, receiving information and research results from scientists.
Adaptive Management	Systems Ecology	Managers, policy makers and scientists	Ecosystems change under high levels of uncertainty.	Experimentation, monitoring and reflection.
Collaborative Management	Participatory Democracy	Everyone who has a stake in the resource.	How to work together, how to build relationships.	Deliberation, sustained interaction, exposure of values, knowledge and sharing.

2.7 Understanding history is necessary to deal with current water challenges

The effects of history present an example of something that can't be measured and yet has very real effects on the practice of water resource management. This is particularly the case if we understand the complexities of water resource management and accept that we are dealing with a socio-ecological system. Many of the social sciences emphasize the importance of history in understanding our current challenges (Wals, 2007). This issue is revisited in section 6.2 below, in our discussion of the history of the SA water sector.

2.8 The Democracy project in South Africa informs SA water research

The democratization of resource management parallels the transition to a democracy in South Africa. Democratisation requires that citizens have an adequate understanding of water issues from both social and natural perspectives, and it is expected from water researchers and the WRC to provide or encourage this understanding. Democratising water requires an active citizen's approach where citizens as well as decision makers in other sectors are well informed and responsible actors. This implies the ongoing empowerment and participation of citizens and government and places learning and capacity building as a core process. This is an important theme in the new National Water Resources Strategy which argues, together with the National Planning Commission, that water needs to be considered in all planning decisions in South Africa.

The use of social science and transdisciplinary synthesis are crucial in developing both evidence based policy making and public knowledge that encourages public debate and builds public knowledge as well as understanding urgent social problems and developing robust theories and methodologies that provide innovative possibilities for democratizing and developing sustainable water management practice.

2.9 South Africa is a rich social laboratory that can contribute lessons internationally

The political transition in South Africa and especially the South African water sector, offers rich research material⁵ for the social sciences as well as an imperative to address immediate and important issues in our society that are crucial to the realization of ecological sustainability. This is reflected in the paradigm of Integrated Water Resource Management (IWRM). The social sciences are needed to work with this material, and promote SA Water Research as a sector in the knowledge economy, already enjoying a comparative advantage (Naidoo, 2013), to compete successfully in the international knowledge economy.

Research into water, and the resultant practices, is an area for investment in the SA knowledge economy sector, and can become as much an export product as the products of the extractive industries – consisting both technical and social solutions to water challenges, especially in other developing countries.

⁵ Some of this rich material includes: the social transformation and democratization project, South Africa's early commitments to the human right to water, to inclusive and decentralized governance in catchment management, the emergence of water as a development constraint, the challenges facing developing local government, an active citizenry, social protests around water and other services, the co-existence of sophisticated urban and poor rural areas and the challenges of extensive informal settlements, discussed below in section 6.2.

2.10 Current WRC research show the need for and potential of social research

Current WRC research and discussions within the WRC show the need for, as well as the usefulness of social research in the work of the WRC. The following are not exhaustive, but illustrative examples:

1. The multidisciplinary and transdisciplinary work in Integrated Water Resources Management, where issues of dialogue, stakeholder participation, social learning, and communities of practice, call for an engagement with the social sciences;
2. Water use and wastewater: where there is a need to understand institutions, policy processes, citizen and consumer behavior, including the social dynamics of protests;
3. Point of use systems, where social researchers need to work with inventors on issues such as technology transfer, social acceptability, and negotiating technology.

Chapter 3: What is social research?

Knowledge work was not always as specialized as it is today. During the Renaissance, people could pride themselves in being skilled in many areas. Da Vinci, for example, was a skilled musician, artist, biologist and architect. He used his understanding of the human anatomy to design buildings (White, 2000). Philosophy was not seen as separate from science and the exploration of the world was integrally linked with questioning how we know about this world. Science, first and foremost, arose as a philosophical endeavor. Hume's thinking and questioning, for example, gave rise to empiricism. It was a revolutionary idea during his time and freed society from the grips of superstitious belief. But it was also reactionary and changed the way in which we judge knowledge and the truth of knowledge that still affects us today (Guyer, 2012).

3.1 Overview of social science disciplines

The social science disciplines emerged in response to social questions that arose because of changes in Western society. Anthropology emerged as a discipline in response to the increase in naval exploration in Europe. Naval advancements allowed European ships to navigate the globe and come across new cultures. These new cultures were so different from the European culture that they became something worth studying (Hylland Eriksen, 2004). These are dubious roots for a discipline. Although Anthropology was informative for the Europeans that studied it, it did lead to seeing other cultures as 'other' to one's own. Anthropology has changed a lot since then and is more a science of understanding cultural impacts on the way we do things. Archeology as a branch of anthropology also became increasingly valuable as a tool to unearthing past civilizations in an attempt to understand our roots acknowledging the importance of the past in understanding our current position and place in the world. Anthropology also gave us the methodology of ethnography which gives us a deep understanding of culture and context (Clifford and Marcus, 1986). Both of which are seen as increasingly important to understand in managing water.

Sociology became a recognized discipline in Europe with the challenges of modernity: increased urbanization of the human population and the role of industrialization on the social organization of people (Cragun and Cragun, 2011). One of the key debates in sociology is the role of agency (our ability to act) and structure (the institutions within which we act and which influence, guide and often constrain our action). An example of structure would be the family unit, institutions and organisations or larger structures like 'the church' or even intangible structures such as 'patriarchy'. The theories and methodological tools of sociology help us understand these influences: how structures are formed, what power they have over us, and what enhances and constrains agency (Archer, 1995; Berger & Luckmann, 1966, Bhaskar, 1989; Elias, 1978).

Understanding the human mind has been a concern of people since ancient Greece. Psychology only emerged as a discipline when it became something to be measured and tested. It also grew as a discipline with the growth of education for the masses as a way of preparing society for a work force and as a means of changing behavior. Behavioural psychology arose out of biology and the study of animal behavior and how this changed according to different stimuli. This was known as classical conditioning. There was a theory that humans, viewed as animals, could be influenced in a similar

way (Hock, 2002). What psychology gives us today is an understanding of how our internal environment and personal history directly influences the way we act in the world and how we view ourselves in relation to others. This has major impacts on the way in which we influence social structures. An example of this would be the theory of the authoritarian personality to explain why people who have been oppressed by an authoritative force will in turn oppress those less powerful than them (Adorno, 1993).

As a discipline, geography bridges social and natural sciences (Mooney et al., 2012). It readily integrates theories and methods from a range of other disciplines. History is one of the oldest social sciences, and has turned its attention to the impact of humans on the earth with great success (e.g. Simmons, 1993).

These are just a few examples of different social science disciplines that have come out of the societies of Europe. In other societies knowledge seeking was equally revered and maybe not so specialized. In the East, spirituality was a philosophical question and the spiritual/ intellectual journey was/is not seen as separate. Philosophical debates draw on different theories which may not be as categorized as they are in the West with a key question being understanding reality and the role of humanity within the world. Many ideas today about how we understand our world were ideas that were known and studied 2000 years ago in India, Greece and other places in the world.

The dominance of Cartesian thought has led us to adopt the disciplines that we are all so used to as 'normal' but it is important to bear in mind that there are many ways of understanding how we know that are not given recognition simply because they don't fall into the current categorization of what stands as knowledge.

3.2 Social science, social research and social outcomes

The need for social research has arisen as we have come to understand the context in which we work differently. This has been influenced by learning moments as well as historical shifts in such as the rise of democracy and thus the need to focus on issues of poverty alleviation and equality and empowerment. How does social research help us address these needs? At this point it will be important to make some distinctions between what we mean by *social research*, *social science* and *social outcome*

Social research: Social research can draw on a variety of social science methodologies and/or science-based methodologies. Although the methods that may be used to answer social questions may draw from a variety of disciplines, the way social questions are framed, depends on an epistemological position. This is why in the social sciences it is important to be clear about the how your questions are theoretically framed if they are to be engaged with, with rigour (See below). Social research doesn't only ask 'how to?' questions such as "how can we provide people with information about their water?" but will question the process of how things are done (social processes) such as "Will providing people with information necessarily change behavior?", "What inhibits people's ability to participate in democratic processes?"

Social science research: Research within social science disciplines that draw on particular social science epistemologies (such as interpretivist or critical theory) and methodologies (such as

phenomenology, ethnography, action research, discourse analysis) and methods (such as participant observation, interviews, focus groups, document analysis).

Social outcome: Research that aims to have a social outcome. Most science-based studies will have as an objective a social outcome. For example, clean water for rural communities. This kind of study may be looking at a particular technology for cleaning water in rural areas and therefore is research with a social outcome. Research that has a social outcome does not necessarily help us understand social processes and how these affect our ability to manage, protect and allocate water for the benefit of all.

The quantitative/qualitative debate: Social research and social science are often conflated to mean qualitative research. This is not the case. Quantitative or Qualitative research refers to the methods used to gather evidence to answer a particular research question. Social research is increasingly drawing on what is known as mixed methods research where both quantitative and qualitative evidence is gathered to answer complex social questions (De Vos et al., 2011). A more important concern than debating whether quantitative or qualitative research is better is what method of gathering evidence is the best for answering the research question. This means considering both the benefits and weaknesses of any given research method. For example if you want to answer the question, “How many people collect water directly from source?” it would be best to draw on quantitative methods such as a survey. If your question is, “How does collecting water directly from the river impact on people’s well-being?” Then you may want to choose a mixed-methods approach of gathering quantitative evidence on the quality of water and distance travelled to fetch water as well as qualitative evidence on people’s experiences of collecting water from the river in the past, and now. In summary, the research methods that are used are not what make a study a social research or social science study, it is the kind of question asked and how this question is theoretically framed.

Different social science traditions.

Social research is usually categorised in terms of:

- a) Ontology (what is the nature of reality?)
- b) Epistemology (what is the nature of knowledge?)
- c) Methodology (How is knowledge developed?)

This is summarized in a table below adapted from Lotz-Sisitka *et al.* (2013), which is itself an adaptation of other typologies.

Figure 4: Ontological, epistemological and methodological aspects of identified research 'traditions' in environmental education curriculum research

Research Orientation or Tradition	Ontology (What is the nature of reality?)	Epistemology (What is the nature of knowledge?)	Methodology (How is knowledge developed?)	Typical Research Methods
Empirical-Analytical	<ul style="list-style-type: none"> • Reality is 'real', 'concrete, material, 'out there' – independent of human thoughts and feelings. • Generalisations about 'reality' can be made free of context. 	<ul style="list-style-type: none"> • Objectivity is the ideal goal. • Values and other factors can produce some bias if not regulated or controlled for. 	<ul style="list-style-type: none"> • Knowledge grows from the gradual accumulation of findings and theories and testing the significance of relationships. (Deductive modes of inference) 	<ul style="list-style-type: none"> • Experiment • Pre-test/post-test • Questionnaire • Survey
Interpretivism/ Constructivism	<ul style="list-style-type: none"> • Reality is not 'out there'. It exists in the human mind, and is conditional upon human experiences and interpretation. • Reality is not independent but socially constructed and can have varied meanings. 	<ul style="list-style-type: none"> • Knowledge is not objective but subjective. • Knowledge is constructed through the interaction of people (including the researchers) and the objects of enquiry. 	<ul style="list-style-type: none"> • Identification and analysis of individual and group constructions or interpretations of reality and an attempt to recognise patterns in them or bring them into some consensus. 	<ul style="list-style-type: none"> • Ethnography • Case study • Phenomeno-graphy • Interview • Focus group • Life-history • Narrative enquiry
*Critical Research	<ul style="list-style-type: none"> • Reality is 'out there'; it is material but interpretations of it can be controlled by human power relations. 	<ul style="list-style-type: none"> • Knowledge is not objective but subjective. • Values and power play a pivotal role in shaping what counts as knowledge. • Knowledge and issues of equity and power are closely intertwined 	<ul style="list-style-type: none"> • Research seeks to understand the practices and effects of power and inequality, and to empower people to transform environmental and social conditions. 	<ul style="list-style-type: none"> • Critical ethnography • Action research
*Post-structural Research	<ul style="list-style-type: none"> • Multiple, representations constituted in and through language and discourse 	<ul style="list-style-type: none"> • Events are understood in terms of powerful and subordinated discourses which 	<ul style="list-style-type: none"> • Deconstruction: Exposing how dominant interests constructed through language and 	<ul style="list-style-type: none"> • Discourse analysis • Genealogy

Research Orientation or Tradition	Ontology (What is the nature of reality?)	Epistemology (What is the nature of knowledge?)	Methodology (How is knowledge developed?)	Typical Research Methods
		constitute social realities	discourse preserves social inequities	
*Critical realist research	<ul style="list-style-type: none"> • Recognition of transitive and intransitive reality • Depth ontology distinguishing between empirical experiences, actual events and the real (that which exists but may not be actualized or visible). 	<ul style="list-style-type: none"> • Knowledge is based on the 'best possible truth' claim, but is recognized as being fallible. • Not everything can be reduced to language. • Events and empirical experiences are understood as being influenced by causal mechanism that may not always be visible 	<ul style="list-style-type: none"> • Explanatory critique – providing complex descriptions of reality with a view to identifying emancipatory options for absencing causal factors constraining actions, or enabling actions 	<ul style="list-style-type: none"> • Follows a process involving description; analytical resolution; abduction or theoretical redescription; retroduction; comparison between different theories and abstractions; and concretization and contextualisation. • Mixed methods can be used, but are not 'compulsory'

These different research traditions have a direct impact on the kind of research we do and for what purpose. Habermas (1972 as quoted in Sisitka, 2013) argues that there are three distinct categories of needs and interests for research:

1. Technical interest which involves a need for mastery and control over the physical world and thus gives rise to a need for instrumental knowledge (e.g. positivist research).
2. A recognition of humans as inhabiting a social as well as a physical world and thus an interest in understanding how social life is shaped and experienced by individuals (e.g. phenomenology).
3. The purpose of research is emancipation from constraints on human reason and thus an interest in critically uncovering ideological origins, addressing inequalities and unequal power relations (e.g. critical and action research).

This does not mean that technical knowledge is not useful, what it means is that the purpose of the research determines the reason why we gather certain evidence and how we use it. For example, if we see research as having an emancipatory function we may still collect quantitative evidence using surveys but we do so with the aim of understanding how social inequalities are perpetuated or how technical solutions can contribute to reducing poverty. Considering the principles of the National Water Act one can see why it is important to consider not only that research produces knowledge but also for what purpose that knowledge is produced, and how our theoretical framing enhances our ability to achieve this purpose, or inhibits it.

3.3 Useful concepts and skills from social research

Reflexivity: This is the ability to reflect on one's own capacity as an actor within society and social structures (Bourdieu, 2004, Archer, 2007). In a research context this means continually questioning one's own position in the light of emerging evidence both in terms of the knowledge that is being generated and the methodologies and methods that are used. Some research methodologies have as part of their practice a reflexive cycle such as action research which works through continual cycles of planning, action and reflection (Carr and Kemmis, 1986) Reflexivity also leads to more rigor and validity in research (Lather, 1986).

Ethical considerations: The ethics of research practice as well as the study of ethics is an important aspect of social research such as understanding what we mean by ethics and how ethics and values influence the kinds of social practices we engage in and decisions that we make. Max-Neef in his argument for transdisciplinarity cites the lack of a consideration of ethics in such disciplines as economics as a key reasons why our economic systems continue to perpetuate inequality (Max-Neef, 2005)

Emancipatory: As mentioned above, social research often has an emancipatory aim both in terms of understanding how our relationship to knowledge and powerful discourses perpetuates inequality, how social patterns in society lead to oppression and violence and how social structures need to change in order to address social and environmental problems.

Social structures and human agency: This is an important debate in the social sciences as understanding human agency helps us understand how humans change their world. Theories of agency that we are probably most familiar with are humans are not free, their behavior is determined by structure (such as family upbringing, education, position in social strata's, emergence in a social history) or humans are free and can rise above structure. A further position is that humans and the structures they have created are so intertwined there is no way of determining which has more power. There is also a position that argues that it is impossible to conflate structure and agency. It argues that structure pre-determines agency, for example we are born into a world that we had no say in. This is quite clear as South Africans. We are born into a country that has gone through apartheid and this means that we find ourselves existing within particular social relationships and a particular kind of governance, and economy. We have no say over this however, we can bring about change to these structures through learning, thoughts and actions (Bhaskar 1989; Archer, 1995). Understanding how this happens is key to understanding the relationship between learning and social change towards more sustainable practices.

Importance of history: One of the most powerful tools of the social sciences and social research is the focus on the importance of history in understanding and changing current situations and practice. We cannot understand a current problem without understanding how we got here in terms of our actions, our thoughts and our beliefs.

Discourse and power: A very important contribution of the social sciences is the emphasis on the power of discourse and that our use of language and symbol is not neutral and can be used to convince us to view our reality in a particular way. An example of the power of discourse is the way

in which the apartheid government used the discourse of black people being a threat to the safety and lifestyle of white South Africans. This was perpetuated with a strong discourse of righteous defiance in the face of international displeasure to the point of adopting the narrative of 'a chosen people' fighting for their right to live in the chosen land. The power of discourse analysis as a research methodology is that it can reveal the underlying power relations hidden in discourse as well as how a discourse can block us in imagining a new way of being. This deconstruction allows us to reconstruct a different picture that may shift the power imbalances.

Revealing underlying mechanisms: Often the methodologies of social research are aimed at getting to the mechanisms that lie behind a particular event, action or problem. By questioning in different ways, drawing on different theories, engaging the problem at different levels and scales and practicing reflexivity, social research often reveals powerful structural mechanisms in society that make it difficult for us to change our practice. An example of this can be seen below in a study taken from the Water Alternatives Journal that describes masculinities at different levels in the water sector (Zwarteveen, 2008, discussed below).

Triangulation with different forms of evidence: Validity in social research is not based on whether an experiment can be repeated. Rather it is judged on whether different forms of evidence lead us to the same conclusions.

3.4 Developing an interdisciplinary framework for water research programmes

Collaborations between different disciplines can produce a rich, multifaceted and informative view of social dynamics in the water sector. The social sciences have developed a range of methods and approaches to describe and research human society. These include dealing with the challenge that much of social research is a negotiation between the researcher and the researched, not a straightforward harvesting of information. Social scientists rely on the tools developed in each discipline to define the (social) objects they study, provide the language in which statements of these objects can be made, and explain the methods by which valid knowledge of these 'social objects' may be gained. Social objects can be entities like 'society', 'democracy'; 'development' and 'community' whose meaning is not always evident or easy to agree on but need to be stable enough for research to proceed.

The need for synthetic work can be embraced as an opportunity for developing research programmes that directly respond to the needs of the sector and as a way of progressing beyond the science/ social science debate. If a synthetic framework is adopted then different disciplines with their different approaches, methodologies, terminologies and methods give multiple viewpoints on complex questions and address different aspects of the problem. The result is both integrated knowledge and the emancipation of knowledge as all knowledge systems are understood to contribute to the development of theory to guide action. The emergence of inter/trans-disciplinary work is relatively new and the research literature is amok with different terms, from cross-disciplinary to trans-disciplinary. For this report we have adopted Bhaskar's (2010) definitions as described in the table below (adapted from Price, 2013). According to these definitions we will use the term interdisciplinary to describe the synthetic framing needed in the water sector.

Figure 5: Bhaskar’s Typology of Inter/trans-disciplinary approaches (from Price, 2013)

Typology	Definitions
Multidisciplinary	Pooling of the knowledge of the different disciplines, the final result being a series of reports pasted together, without any integrating synthesis. Same as Max-Neef’s definition (2005)
Interdisciplinarity	Synthetic interdisciplinary integration of the knowledges of different disciplines, using an integrating framework such as Bhaskar’s laminated system of seven layers of scale (2010) or Max-Neef’s ‘transdiscipline triangle’ (2005).
Transdisciplinarity	Involving the creative employment of models, analogies and insights from a variety of different fields and disciplines, e.g. Darwin’s theory of evolution required him to be <i>au fait</i> with more than one discipline, specifically biology, genetics, archeology, natural history and geology (his was an interdisciplinary knowledge – its geohistorical aspect pushing him at times outside the limit of empiricist science). Darwin’s theory was not just relevant to just one discipline, but to many disciplines and he used the analogy of ‘competition’ and ‘survival of the fittest’ in terms of humans to allow him to develop his understanding of ‘competition’ and ‘survival’ of the ‘fittest’ in terms of genetic material. Marx’s theories were also transdisciplinary and involved analogies, such as the analogy of Capital as ‘constantly sucking in living labour as its soul vampire-like’.
Cross-disciplinary	Involving the potential to empathise with, understand and employ the concepts of disciplines and fields other than one’s own. Similar in principle to, but broader than, Max Neef’s interdisciplinarity and identical to Max Neef’s weak transdisciplinarity.

Many of the writings on inter-disciplinarity discuss how research needs to change in order to develop the skills necessary to deal with a complex world (Bhaskar,2010, Max-Neef, 2005 and Russel et al., 2007). The specialization of the disciplines has led to a very deep understanding of very specific phenomena but not necessarily to the connection between these phenomena in relation to problems in the 'life-world' (Hirsh-Haddon et al., 2008). This has led to a need to understand the role of different knowledge systems (or disciplines) and what they have to offer (Max-Neef, 2008, Bhaskar, 2010, Hirsh- Haddon et al., 2008). Hirsh-Haddon *et al.* (2008) describe the problem with science as the split of scientific knowledge from the 'life-world' or social world we live in. It is this split that transdisciplinary approaches are trying to bridge. Transdisciplinary research is research that is happening in the life world and as part of the life-world not research that is done to deduce principles in laboratory situations.

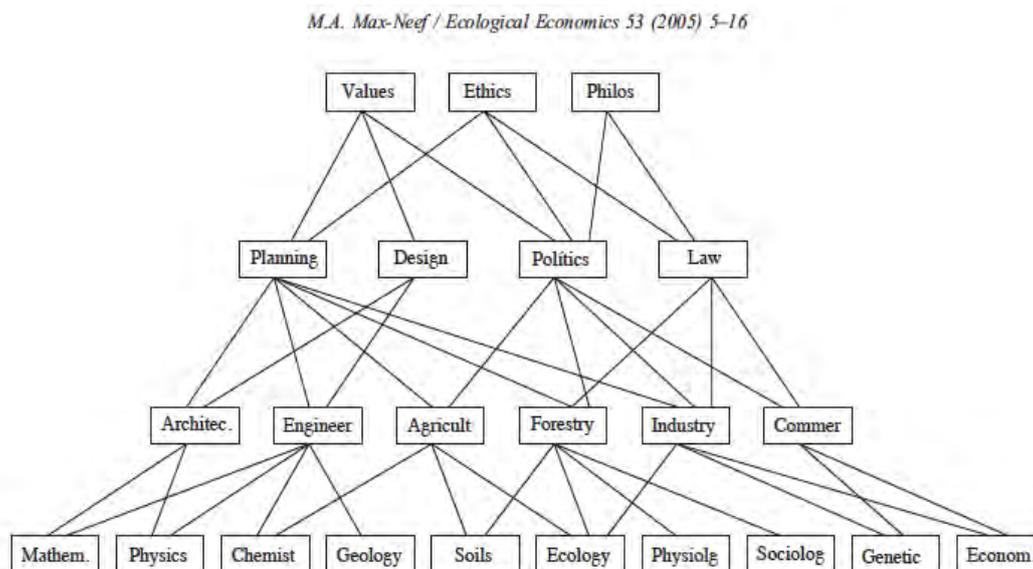
We are not arguing for an erasure of the disciplines. Disciplines are both enabling and constraining. They enable by forming stable institutional structures, transmitting knowledge and methods,

traditions of asking questions and establishing standards of acceptability, terminologies, etc... and they constrain by sometimes over-zealous conceptual hygiene, unnecessary jargon invention, and academic career paths that effectively block interdisciplinary exploration (Del Favero, 2003).

In some cases, an integrative framework is adopted for this process for example the Capabilities Approach of Amartya Sen, by the Anthropology of Water research group at UWC. In other areas, the development of “communities of practice” (as in Integrated Water Resources Management) leads to the development of shared vocabularies and research tools, theorized as social learning (Van Wyk *et al.*, 2009; Roux *et al.*, 2006).

Some projects use meta-positions to guide the design of research and practice such as the SANPAD/WRC project: From Policy to practice: enhancing implementation of water policies for sustainable development (K8/998) which draws on complexity theory and the work of Max-Neef and his framework for synthesising disciplines according to how the knowledge and skills generated from different knowledge systems help us understand and respond to complex life-problems (Max-Neef, 2005). In the case of Max-Neef, knowledge is split up into empirical, an example being Ecology (what exists – the world as it is), Pragmatic, an example being Agriculture (What we are capable of doing?), normative, an example being Politics (What is it we want to do?) and Values, an example being Philosophy (How should we do what we want to do?). Max-Neef’s motivation for what he calls transdisciplinary work is that disciplines, such as science and particularly economics has lost its value base, which is deeply relevant in other disciplines such as philosophy, ethics and other social sciences (Max-Neef, 2005).

Figure 6: Max-Neef’s Framework for Transdisciplinary Work (Max-Neef, 2005).



Max-Neef's framework for transdisciplinary work is only one such model, others include Hirsh-Hadorn et al. (2008) Handbook on Transdisciplinary research where disciplines are organized around systems knowledge (What we know?), target knowledge (What are the gaps? This includes identifying and taking into account needs in order to develop better societal practices) and transformational knowledge (establishing technologies, regulations, practices and power relations). In this case, the argument for transdisciplinary work is that science is not emancipatory and does not deal effectively with problems in the real world (Hirsh-Hadorn et al., 2008).

Roy Bhaskar from the Critical Realist school deals with deep philosophical problems in western philosophy which have led to confusion between the way the world is and how we know the world (Bhaskar, 2008). Part of this confusion has led us to treat the world as a closed system. He advocates for the development of science and social science approaches and methodologies that work within an understanding of the world as an open system where reality can't be reduced to an empirical access to causal laws. (Bhaskar et al, 2010). He, like others, proposes a way of working with many disciplines by viewing reality as laminated with different disciplines addressing different 'domains of reality.' (Bhaskar et al., 2010).

Bhaskar's approach is appealing as it side-steps the debate between the sciences and social sciences and rather questions the philosophical mistakes that we make in both the sciences and the social sciences which are, at the root, a conflation of epistemology (the way we know about our world) and ontology (the way reality is or the nature of being). In the Sciences, he argues that the way we know about the world through empirical evidence (epistemology) has come to be seen as the only way of knowing about reality (ontology). As explained in Chapter one, there are many things that we cannot measure empirically that nonetheless have a profound influence on our reality, history being an example.

The social sciences are not free from this mistake but they have also gone to the other extreme. A great deal of social theory argues that the way we know is socially constructed, meaning that knowledge is constructed through language and cultural experiences and is often context specific. This means that we learn through interaction with others and by applying what we have learnt and responding to what happens. In this case, knowledge is not seen as neutral which makes it possible for it to be used as a powerful tool to keep some people powerful and others powerless. In other words, one person's truth becomes more meaningful influential than another's. It also means that there is no true knowledge out there that we can discover but that knowledge is constructed and created within different social contexts and for different intentions. This is obviously a valid statement. The problem with this relativist position comes when the way we know, an epistemological position (which in this case is understood to be socially constructed) is conflated with the way reality is, an ontological position. The result is that nothing is seen as real, everything is relative and it becomes very difficult to make 'truth statements' about reality.

What Bhaskar argues for, is that epistemology and ontology should not be conflated. It is obvious that the way we know is relative and yet, ontologically there is a true and existing reality. The job then of the scientist (whether natural or social scientist) is to come up with the best possible theory of reality based on what we now know (rigorous evidence).

How does this affect water research? Many of the confusions and misunderstandings within the sciences come down to this conflation of epistemology and ontology. For example, scientists may judge social science according to their way of knowing the world and so judge it as inadequate because it lacks hard empirical data. In this case they conflate their way of knowing reality as reality itself. If it can't be measured, it does not exist. This is obviously not the case.

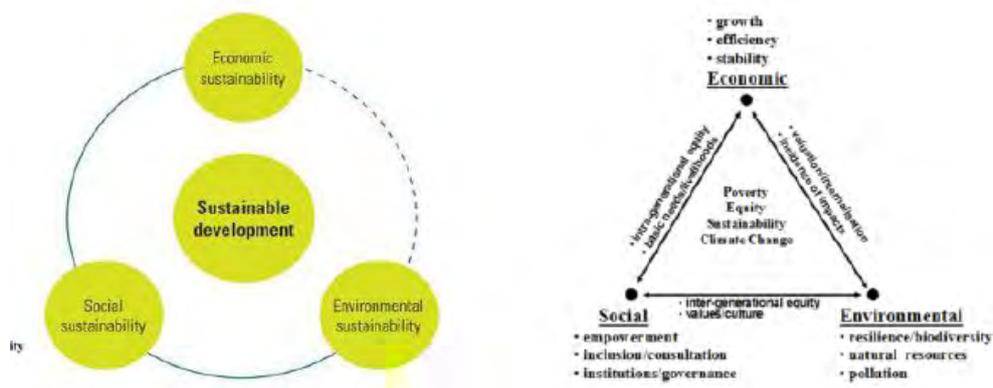
This distinction also helps us judge good science from bad science. Good science is the development of theory derived from either empirical or other forms of evidence that best describes the current situation. Instead of judging science according to our epistemological differences we can judge our work according to how best our theory stands up to reality.

3.5 Using a laminated system as an integrating framework for the water sector

The acknowledgement that we are working with a complex socio-ecological system has led to many researchers to look for some way of framing and dividing our reality so that we have a way of synthesizing our understanding of a system/reality and of understanding where different disciplines contribute to knowledge generation and change.

Some of these 'models' are very familiar to us, such as the following examples by the World Bank and the Encyclopaedia of Earth (taken from Price, L, 2013).

Figure 7: Models of integrating frameworks



Price (2013) argues that although these heuristics are useful and far better than previous monodisciplinary approaches they have two weaknesses:

1. They tend to refer to things that are currently present and empirically measureable. She argues that they include 'components such as face-to-face interactions or relationships (culture), personal circumstances (such as poverty and political standing), characteristics of

society as a whole (such as the number of women in positions of authority) and biology'. Other levels of reality that are not easily measurable are left out such as: unconscious (motivations) and psychological structures... such as values, social structures such as gender relations, geohistorical trajectories and global trends which are historical;

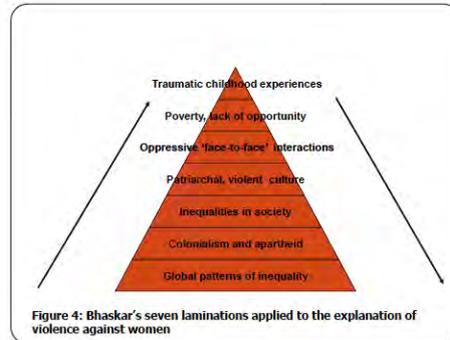
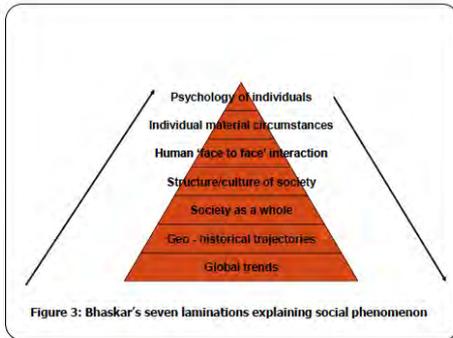
2. By creating layers or aspects of reality like economics, the assumption is that this is a system on its own and does not acknowledge the effects of economics on the formation of say social structures or even psychological values.

Price argues for Bhaskar's laminated system of reality as a better heuristic for the achievement of the integration of knowledge and thus true interdisciplinarity. The aim of this heuristic is to divide the world up for the purposes of research and developing theory. This is not to say that reality is literally divided (although reality is stratified, with some layers emerging from others as conditions of possibility), rather this is a frame to help us understand the layers of social reality we need to investigate in order to be able to start building theory based on the relationships between these different layers. In this frame, the economic, biophysical and the social is dealt with at different layers of the lamination and within differently framed research questions leading to some studies that would be more science based and others that would draw on social science approaches and methodologies. The layers also correspond to the different disciplines which is similar to Max-Neef's model above, except that the focus is not on the disciplines but rather on layers of reality that we can all relate to and experience.

Bhaskar's (2010) lamination is described as follows:

- i. the sub-individual psychological level;
- ii. the individual or biographical level;
- iii. the micro-level studied, for example, by ethnomethodologists and others;
- iv. the meso-level at which we are concerned with the relations between functional roles such as capitalist and worker or MP and citizen;
- v. the macro-level orientated to the understanding of the functioning of whole societies or their regions, such as the Norwegian economy;
- vi. the mega-level of the analysis of whole traditions and civilizations; and
- vii. the planetary (or cosmological) level concerned with the planet (or cosmos) as a whole.

Figure 8: Representation of Bhaskar’s laminated system and how Price has used it to develop an explanation of violence against women (Price 2013).



3.6 Using the laminated system to understand and integrate research: the Kat River Catchment

From around 1999 to 2007 the Water Research Commission was involved, in some form or other, in research in the Kat River Catchment in the Eastern Cape. The initial research proposal was to establish, using participatory methodologies, a catchment management forum in the Kat River. During this process the team was also asked to assist the Kat River Irrigation Board to transform into the Kat River Water Users Association. Finally the WRC supported a stakeholder driven process for developing a catchment management plan in the Kat River. This was one of the first projects in South Africa that was attempting the practice of IWRM within the emancipatory and democratic framework of the NWA. The emphasis was strongly on participation and democracy with a focus on local stakeholders empowerment, representivity and learning being key to transformation.

Although interdisciplinarity was not a well-known term at the time, certain aspects of the team’s work were interdisciplinary, and others were definitely multi-disciplinary. Researchers ranged from geographers, anthropologists, educators, hydrologists and environmental economists. As a first attempt the project was relatively successful. Key results were:

Stakeholders who knew very little about catchment management, both in terms of knowledge, law and institutional structures learnt with the researchers. At the time the NWA was very new and procedures and structures kept shifting and changing as the whole of the water sector tried to find common understanding. Researchers in the Kat River were engaging with stakeholders within this environment and so, very early on, adopted certain principles of participation, learning and reflection that guided every interaction with stakeholders.

Representative bodies were formed and transformed and learnt to work together in a co-operative manner. This was not an easy achievement given that this was literally a few years after the end of the apartheid government. All stakeholders developed a catchment vision, which included an understanding of one’s place and influence within the catchment) which in turn led to deepening collective action and collaboration.

What was not achieved was sustained support for the catchment forum and the water users association. This led to the actual organization (the catchment forum) not functioning. Why was this the case? The catchment forum consisted of poor rural dwellers in the upper catchment. Their involvement was strongly supported by Rhodes University right down to providing transport for representatives to travel to meetings, such as the WUA meetings. Researchers also acted as mediators of knowledge, keeping the catchment forum informed of what was happening, what new research reports impacted on their context, reporting back on scientists findings in a way that they could understand and that was context specific. If members struggled to engage sufficiently at larger meetings, researchers would both pick up on the reasons for their lack of participation and would run workshops to make sure that representatives had the information and skills they needed in order to participate. This was done on a shoe-string budget by very dedicated and passionate researcher practitioners and students. At the time the importance of social research and the cost of engaging effectively with stakeholders was little understood and so not funded adequately.

When the Rhodes University researchers left at the end of the research project all this support fell away. Rhodes University researchers did try and engage the local municipality and the provincial Department of Water Affairs to take up the responsibility of ensuring the catchment forum remained functional and supported but this did not happen. Why?

This is where using the laminated system to understand research programmes, gaps and tensions becomes useful. We won't go into a detailed analysis for this report as this will form part of Deliverable 2, however on a quick first glance one can see where gaps lay and how research into these areas would have been/and probably still will be useful.

The Kat River social researchers tended to focus on developing the agency of the stakeholders within the catchment (levels i-iii in figure 8). This can be understood from a historical perspective because the agency of most South Africans had been legally limited under the laws of apartheid (level vi). The researchers were not able (due to various constraining factors) to work at more structural levels (levels iv-v) such as capacity within local government and municipalities to support emerging and transforming institutions, and how the culture of these institutions inhibited real change, although the frustrations of not understanding or not being able to work with these structures was dearly felt by the researchers and stakeholders. The researchers also didn't have much influence over other structural constraints at these levels, such as how funding was allocated to research of this nature and the limited understanding of social research within the water sector at the time.

By using the laminated system one can quite quickly and clearly identify where gaps and tensions lay in the Kat River Valley case study. This provides an important learning opportunity but also highlights how research funding organisations, such as the WRC, can develop an integrated picture of research to understand both the benefits of the social research being done and the gaps for further research.

Chapter 4: Recognizing the Anthropocene: the integration of social sciences into earth system sciences

4.1 Introduction

In this chapter the efforts of integrating social science into the global research programmes of earth systems science are traced, as an instructive example of how such processes work (Mooney et al., 2012; Cornell and Parker, 2010). An outcome of this process that was held in May 2013 under the title “Water in the Anthropocene” (Global Water News, No 12, October 2012).

Today it may seem obvious that “knowledge for climate change, and for sustainable responses to it, must involve a wide disciplinary range from biophysical climate science, through to social science understanding of social structures, including the cultural and ethical aspects that frame and motivate human action” (Cornell and Parker 2010: 25). However, it took almost three decades for this insight to be translated into institutional and disciplinary reality. By tracing the broader process since the 1980s, we identify some of the possible obstacles, that the integration of the social sciences in the SA Water sector may face, and how to overcome them.

Since the mid-1980s, concern about climate change has been the main driver for integrating different disciplines into a holistic understanding of the earth, with the important task of providing a knowledge base for decision making that would affect energy use, economic planning, and potentially ameliorate the impact of climate change on people and ecosystems. Three questions dominated climate change research: is discernible climate change taking place? Is climate change anthropogenic (caused by human activity)? How do we deal with climate change?

While the first question could be answered by natural science, the other two would increasingly need to rely on understanding human behaviour, or systems of human interaction with the earth.

4.2 The process of integration

We can count 30 years from the first failed attempt (at the 1983 preparatory workshop for the International Geosphere Biosphere Programme (IGBP)) to current integrated programmes (Mooney et al., 2012). In the 1980s, the physical sciences like geology and meteorology were at the core of climate sciences, partly because they could best describe the impacts of climate change, and partly because they were regarded as mature sciences, with “clear and unambiguous ways of defining, ordering, and investigating knowledge” (Del Favero, 2003). The 1983 planning workshop faced the challenge of integrating the life sciences in the biosphere, and concluded that the challenge of integrating the life sciences was so big, it was decided to delay the integration of social sciences, despite an acknowledgement of the contribution they could make (Mooney et al., 2012: 8). With hindsight, it could be argued that the life sciences could have been expected to provide a bridge for the humanities, as the history of the idea of a socio-ecological research object in resilience thinking (Folke, 2006) suggests that the life sciences may easily open the door to the humanities (see appendix 3 for a “travelogue” of the resilience and adaptive management perspective through an array of disciplines and fields).

Observers of the deliberations in 1983 analysed the obstacles to integration. The geographer Robert Kates identified a lack of respect between disciplines, and different reward systems (Mooney, 2012). The reward systems relate to how disciplines are organized (see Del Favero, 2003, for a detailed explanation of the concept of disciplines). Disciplines are basic to the institutional organisation of academic life, and its rewards and resources. In practice, overcoming disciplinary boundaries is not easy, precisely because disciplines provide “the structure of knowledge in which faculty members are trained and socialized; carry out tasks of teaching, research, and administration; and produce research and educational output” (Del Favero, 2003).

The sociologist Roberta Miller identified four issues:

The first was “unrealistic expectations by the partners on what each party can deliver related to the foundations of the disparate fields”. This is the result of the distances between and a lack of knowledge of each other’s disciplines: what other disciplines could do (but that is not imagined from the confines of another discipline) and what they cannot do. Again, what is needed is a meta-theoretical knowledge of what the other disciplines can do – or examples of such work, or facilitation of such work (where synthesis is a speciality that not all researchers in the team need to have). It has been observed that some members of interdisciplinary teams function very well without “getting into the interdisciplinarity”.

The second obstacle was “problems related to the nature of the data that each party can bring to bear to a given problem”. Different disciplines do work with different types of data, as Cornell notes:

For interactions between the social and earth sciences to succeed, a certain level of tolerance and mutual understanding will be needed so that social scientists understand the earth science aspiration for quantitative socioeconomic scenarios and predictions, and earth scientists understand the variations in how social scientists explain human behavior and institutions and accept the clear limits to predicting human activities and decisions.” (Cornell, 2010: 140)

Critical realism specifically tackles the synthesis of knowledge across different fields, as explored above in section 3.6.

The third obstacle identified by Miller was “the tendency of one field to dominate in problem identification”. This is important because it is at the stage of problem identification that the tools and techniques of each discipline are oriented towards the knowledge that needs to and can be created. The analytical stage in problem formulation is important. In many ways, this is a “pre-scientific” stage, as Kerlinger points out in his *Foundations of Behavioral Research*: “During initial problem formulation, the scientist will usually experience an obstacle to understanding, a vague unrest about observed and unobserved phenomena, a curiosity as to why something is as it is” (1986: 11). It is easy to see why internalized disciplinary training, world view as well as personality are crucial at this stage. Hirsh-Hadorn *et al.* (2008) define three stages of transdisciplinary research the first being problem identification. At this stage a variety of disciplines are drawn on to understand, describe and articulate the problem.

When disciplines are invited as “add-ons”, they miss out on defining the opportunity for knowledge creation, and moreover are expected to play a subservient role. For the social sciences, this has often been as communicator for already agreed on solutions, with unfortunate effects:

“Unfortunately, the physical scientists’ clamouring for ‘better engagement with the social sciences’ often carries an implied caricature of social scientists’ (presumed) skills as public communicators, and their expertise in the machinations of social engineering and political mobilization. It is not surprising that the social science community engaged in human dimensions research sometimes responds less than positively.” (Cornell, 2010: 140)

4.3 Scale and context

An interesting and persistent obstacle – because it influences methodologies and the aggregation and integration of research questions and their findings – was that the social and natural sciences habitually “work at different scales”. Social science often works with the local, as human behaviour is often locally determined, because of local culture and institutions. This leads to the social sciences also facing the perennial question of how or indeed whether local studies can yield generalizable “laws” in the manner of the natural sciences. Scale effectively brings with it the question of differing and dynamic contexts – a problem arguably not faced by the physical sciences, but definitely confronting those studying the biosphere as well.

According to the Water Alternatives Manifesto: “Scale has also emerged as a crucial factor. Water management solutions are clearly scale-dependent, from the user or community level to the system (distribution network) and river basin levels. Yet these scales come under interaction through the hydrologic cycle, often in an uncontrolled manner, prompting the need for corresponding nested levels of management and governance” (WaA Manifesto, 2008).

The critical realist approach is specifically aimed at enabling integration not only across disciplines, but also across scales. It can also be used to unpack the different spatial scales at which mechanisms in a specific research question may be at work.

The slow integration of the social sciences into the earth system sciences can also be explained by differences in time scale on which different disciplines focus. The two Bretherton reports (from 1988, discussed in Mooney *et al.*, 2012) illustrate this point. The first looked at global change on a geological time scale, “over thousands to millions of years, where such processes as plate tectonics and solar variability are the main drivers”. Because of its scale, this report did not show anthropogenic influences. It was the one chosen as the basis for the IGBP planning which excluded the social sciences in 1983.

The other Bretherton report “was a view over decades to centuries, where human activities are an important driver of the physical climate system and biochemical cycles” (Mooney *et al.*, 2012). The classic *The Earth as Transformed by Human Action* (Turner *et al.*, 1993), chose a time scale of 300 years. In his foreword to the book, Robert McC Adams considers the radically different results that choices of a 500 year scale (European domination and colonialism) and a 1000 year scale (at the start of which “the advanced centers of civilized life lay well to the south – in resplendent Islam

along the southern shores of the Mediterranean and in the Near East, and in the central Mexican, Mayan and Peruvian civilizations” (1993: ix) would result in. Whereas the earth sciences may measure events in millions of years, in the social sciences centuries can make a big difference.

4.4 Easier integration on a national level, and led by social scientists themselves

It was easier to bring scientists together on a national level, as the example of the US Global Change Research Programme shows. In a 1988 plan for this programme, four key areas were proposed: global land use change, industrial metabolism, usable knowledge of global change and institutions for management. When the focus narrowed in the development of the programme, the topics were narrowed to two processes that were drivers of physical changes: land use and industrial metabolism. (Mooney *et al.*, 2012: 2). This may mean that a process of contiguity was at work: social sciences were integrated on the principle of being closely related to, therefore understandable and also seen as useful, by the natural scientists who were in command of the programme development. This remains a hypothesis to be tested.

One possible reason is that international programmes are notorious for being driven by diplomatic politics that may have little relevance to content matter (Batisse, 2005). In the Mediterranean case, discussed below, there was an explicit commitment to “a dialogue without prejudices” (El Moujabber *et al.*, 2008: 6), which arguably excluded discussion of some region wide conflicts (see below, section 5.3).

It was also easier for social scientists to initiate integration from their own side. Between 1986 and 1990, the international social science community (the International Social Science Council and its Human Dimensions Programme) decided to and proceeded to develop a research programme that would be supportive of and complementary to the slow developments in the IGBP discussed above (Mooney *et al.*, 2012). The research components were:

1. Social dimensions of resource use;
2. Perception and assessment of global environmental conditions and change;
3. Impacts of local, national, and international social, economic, and political structures and institutions;
4. Land use;
5. Energy conversion and consumption;
6. Industrial growth; and
7. Environmental security and sustainable development.

Implementation was delayed until 1996, when the Human Dimensions Programme was established in Bonn, Germany. Again priorities were reduced to three:

1. Institutional dimensions of global environmental change,
2. Industrial transformation and global environmental change, and
3. Human security and global environmental change.

Two principles are suggested by these experiences: national level integration would be quicker than global integration, and social scientists can speed up the process by taking the initiative themselves. A direct translation to South Africa would be that it is a great advantage that much of the research community is already organized as part of a South African water sector (in the sector wide approach), and that the integration of the social sciences into the work of the WRC needs to be driven in the first place by social scientists themselves.

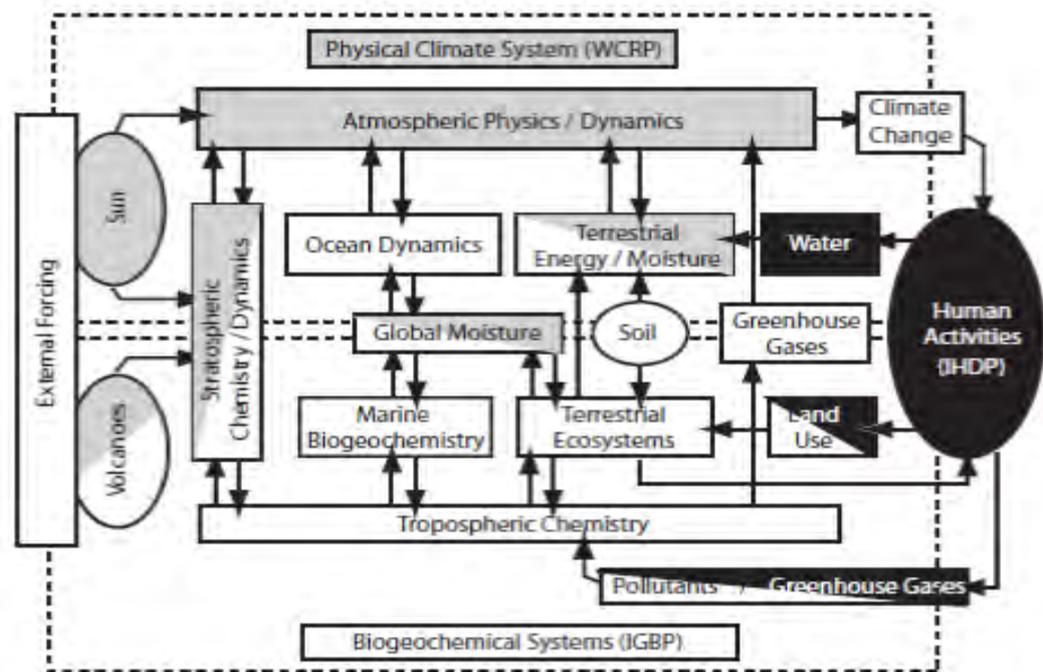
4.5 Recognising the Anthropocene

The logic of the Anthropocene is inescapable because, in the words of Zalasiewicz et al. (2010), “the Anthropocene represents a new phase in the history of both humankind and of the Earth, when natural forces and human forces became intertwined” (2010). Reasons by Zalasiewicz et al. include: unprecedented population growth of one species, since humans are expected to reach the number of 9 billion in 2050; climate change, sea level rise, polar ice melt; a sharp increase in rate of species extinctions; changes in marine ecosystems from increased acidity in the oceans; anthropogenic changes in soil profiles and the presence of radionuclides (2010).

Since 2008, geological committees have been seriously considering adopting the new term. Popularly, it has already established itself. In global change studies, climate change is DEFINED as anthropogenic, that is driven by social dynamics. The question is how to understand these dynamics. We need to understand what are the social drivers of the human impact – such as population growth, consumption patterns, in turn explained by value and belief systems, which opens up the whole register of social science explanation, such as the relationship between consumption and population growth, between population and growth (fertility) and security (e.g. in old age; social security systems, the social wage – that is the political economy), as well as explanations for poverty explanations. These are issues that feature strongly in sustainable development studies (Sachs, 2007).

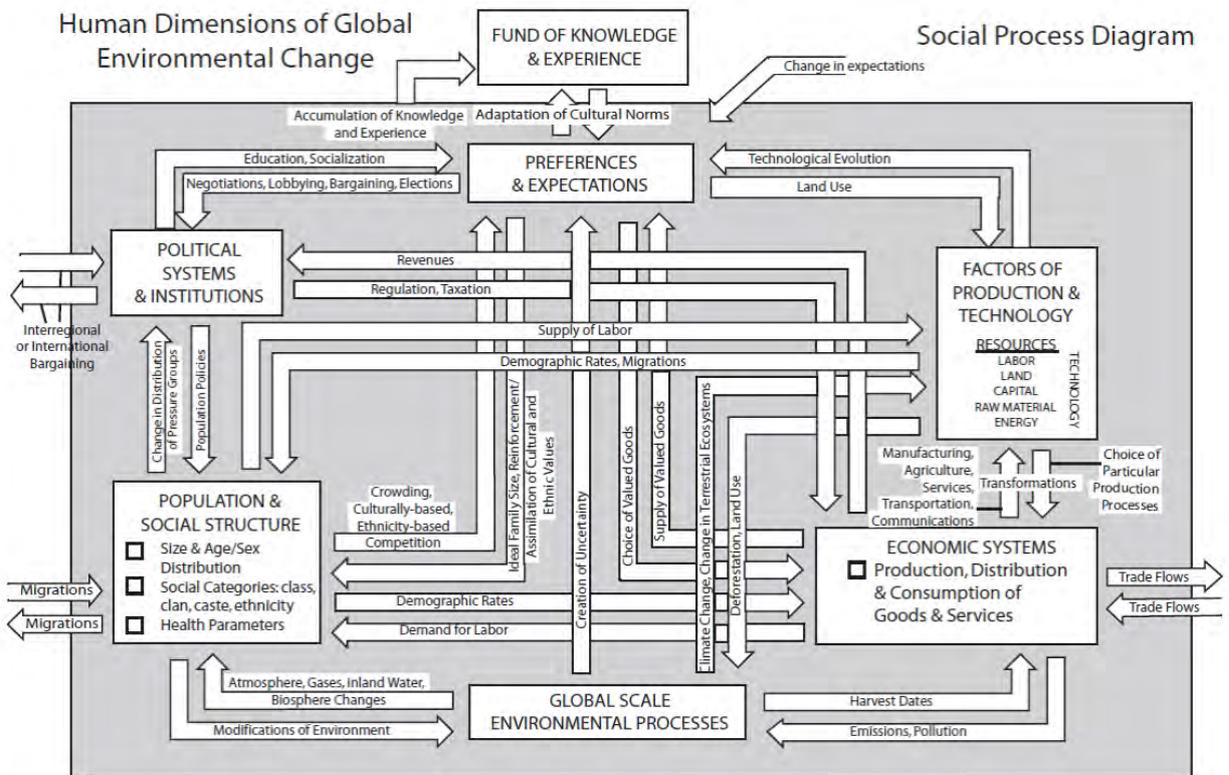
The following two diagrams (figures 9 and 10) visually illustrate how humans, societies, and social institutions, have become increasingly recognized to be “fused” or implicated in many systems. The first is from Bretherton’s 1988 (human scale) report, discussed earlier, and the second from 1993, adapted from the Centre for International Earth Science Information Network at the University of Columbia (CIESIN at www.ciesin.org) (both figures are used in Mooney *et al.*, 2012). The contrast between two diagrams shows how the idea of human involvement in global change infiltrated the diagrams.

Figure 9: The Bretherton Report (1988) showing marginal influence of social dynamics (quoted in Mooney *et al.*, 2012).



By 2001, this integration of social dynamics is clearly articulated in the Amsterdam declaration (see appendix 1), in which 1 500 scientists belonging to four international global change research programmes – the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP) and the international biodiversity programme DIVERSITAS – expressed their urgent concern over “the ever-increasing human modification of other aspects of the global environment and the consequent implications for human well-being” and stated that “basic goods and services supplied by the planetary life support system, such as food, water, clean air and an environment conducive to human health, are being affected increasingly by global change”. By 2013, these organisations were planning to host a conference dedicated to “Water in the Anthropocene”.

Figure 10: Human dimensions portrayed as implicit in all change processes (CIESIN, 1993, quoted in Mooney et al., 2012):



Chapter 5: Hydropolitics in Southern Africa, water and conflict in the Mediterranean and the online journal Water Alternatives

5.1 Introduction

In this chapter, three specific initiatives to introduce social research or a social research agenda into different water sectors are examined. The first example is South African, the collection *Hydropolitics in the Developing World: A Southern African Perspective* (Turton and Henwood, 2001); the second the creation of a research agenda around “water and culture” and “water and conflict” in the Mediterranean (Moujabber et al., 2008), and the launch and publication over five years of the international online Journal *Water Alternatives* (2008 to 2012). cases studies to illustrate historical processes of incorporating social science into the water sector, or very similar sector (global change systems). demonstrate the contributions that social science perspectives can make to water research. A Southern African perspective on Hydropolitics

5.2 Developing hydropolitics as a discipline

In 2002, the African Water Issues Research Unit at the University of Pretoria, published *Hydropolitics in the developing world: A Southern African perspective*. In order to “develop the discipline of hydropolitics in a manner that is beneficial to a wide range of role players” it explored the issue of scale (from individual to the planet) and the range of issues, including “conflict and its mitigation, states and non-state actors, water service delivery, water for food, the social... political... and psychological value of water, water demand management..., water as a target of aggression, water as an instrument of peace, water and gender, water and ecosystems, and water as a critical element in sustainable development” (2002: 17).

Two contributions are sampled here for the way in which they develop theories about the SA Water Sector. The first, from Turton and Meissner, “*The hydrosocial contract and its manifestation in society: A South African case study*” is programmatic in its ambitions, just as the book itself. It gathers up a 150 year history in a theory of social contracts between citizens (water users) and the state, determined by the extent of water scarcity. In a related article in the same book, it is made clear that this theory specifically applies to arid and semi-arid areas. It aims at correcting understandings that developed in the water rich North, which are at times unthinkingly imposed on both theory and practice in the South (Allan, 2002). According to this theory, initial water scarcity in the first transition, causes water users to lose their direct connection to water sources. The South African example is the arrival of gold mining in the late 19th century, and its effect on fountains and aquifers in the Rand region. Water users turn to the state for provision, in this case exemplified by the establishment of Rand Water in 1902. (Turton et al. (2006) later tied the dynamics leading to the second Anglo-Boer war (1899-1902) to this transition as well.) The state turns into a water provider focusing on the supply side, through the building of dams and the engineering of water. This may grow into a “hydraulic mission”, wherein great public water works become one of the legitimations of the state’s existence and practices, and the water sector is dominated by a “discursive elite” of engineers, “united by one overarching paradigm that is based on Newtonian physics and

underpinned by Baconian Cartesian philosophy. This combination of reductionism with the desire to control nature becomes the norm” (2002: 46).

The second transition took place in 1994. Turton presents the democratic transition as achieving a hydrological transition: “... the balance of hydropolitical privilege within South African society was redistributed... The discursive elite changed with economists, environmentalists and social scientists all challenging the hegemonic status of engineers, thus leading to a new form of discourse and ending the purely supply-side phase of water resource management” (2002: 54). Turton emphasizes the need for consensus seeking after the second transition, including the role of civil society and public opinion. His argument also carries a distinction between first order water scarcity (a physical scarcity) and second order scarcity (lack of institutional ability to manage water). The democratic transition in South Africa has to deal with both.

The Turton/Meissner perspective is important because it presents South African water history with an analytical intention, that is a theory based on water scarcity (and deficit). It makes the political nature of water, and of water discourse, explicit on its chosen scale, that of the nation state and a national water sector (the authors also place these developments in an international context, 2002: 57).

In the same book, this “second transition” is viewed from a grassroots perspective with a transformation agenda. *From bucket to basin: A new paradigm for water management, poverty eradication and gender equity*. The authors are a senior DWA policy maker, an international researcher and a grassroots activist. They emphasize the historical moment and start their argument with “South Africa is the first country in the world in which water is seen as a tool in the transformation of society towards social and environmental justice” (Schreiner, Van Koppen and Khumbane 2002: 127). They highlight “the far reaching implications of the new paradigm” as well as the challenges that lie ahead (2002: 127).

The core of their argument rests on a very specific understanding of water scarcity, that fuses together the emancipatory potential inherent in a poverty-gender-water perspective:

“Water deprivation is an intrinsic dimension of the general state of deprivation that is poverty. For poor people, water is so scarce that even the basic human needs of health, food and income for which water is indispensable, are not met. Water scarcity, defined from a human perspective, is the extent to which human needs for water for domestic and productive purposes remain unfulfilled, both in terms of water quantity and quality. In this sense, only poor people face water scarcity, usually even in circumstances where the natural endowments of water resources are abundant. Society “manages” poor people’s demand below acceptable levels. New, pro-poor demand management would increase their demands” (2002: 128).

Focusing on the Catchment Management Agencies, two scenarios are sketched. In the one, previously disadvantaged water users are marginalized further by “a form of public participation in which those who were in power during the apartheid era within the government and among consultants and large scale water users capture the new public space. They would primarily serve their own interests and the interests of large-scale users despite claiming to ‘represent the public’”(2002: 136).

In the second scenario, previously marginalized water users are brought into catchment management structures from the first. “The basis of all water management is recognized as beginning on the ground, in communities, especially among women. There is special attention to water needs and existing water tenure arrangements in previously disadvantaged communities. Local capacity to use water for improved wellbeing is reinforced. Only water management issues that, by their very nature, require being addressed at higher, more central levels, are brought to those levels” (2002: 138). The authors conclude that the second scenario will serve the intentions of new policy and legislation, and point to the hard work that needs to be done to achieve it.

In this perspective, the second transition has merely created a space for hydropolitical work – not guaranteed its success. They also define a very specific content for the concept of water scarcity – aligning it to a human right to water both domestic and productive (generating food security and income in order to eradicate poverty) – thus defining a full range of water needs and water rights. Both articles work with water scarcity, politics and a notion of contested discourses or representation as part of the politics of water. The hydropolitics theory explicitly points to the importance of scale and meshes well with the framework of critical realism where it matters on what scale research questions are asked, and how mechanisms that perpetuate poverty and conflict can be identified across scales with the intention of changing these mechanisms through policy interventions.

Taken together, these articles reflect an acute awareness of the political significance and transformative potential in the SA water sector after 1994. The outlines of a social research agenda, concerned with both apartheid water history and the theory and practices of a water sector in transformation, have already been drawn. These concerns are pursued further in Part 3, below in a suggestive outline history of the SA Water Sector. Next, our attention turns to a 2008 publication focusing on “water culture” and “water conflict” in the Mediterranean.

5.3 Water culture and water conflict in the Mediterranean area

The publication “Water culture and water conflict in the Mediterranean area” was the result of the first workshop of the Mediterranean Dialogue on Integrated Water Management (MELIA) (<http://www.meliaproject.eu/>) an initiative of the International Centre for Advanced Mediterranean Agronomic Studies, with 13 members countries, founded in 1962. The dialogue was structured...

“to include, on the one hand, players with experience in the scientific, technical and socio-economic sectors, experienced in past of on-going European, national or regional projects and networks and committed to a dialog without prejudices. On the other hand, other players such as basin management organisations, water suppliers to cities, industrial groups, agriculture water users, NGO with contrasted experience in day to day management of water related issues, knowing perfectly well the limits of the actual management systems, the expected demand and the possible baseline of the future conflicts” (El Moujabber, 2008: 6)

The Mediterranean has a rich water culture, as a long established cultural response to the need for careful management of scarce water. This is evident in this collection. What is also striking about water knowledge in the Mediterranean is its continuum from ancient times, reflected in

contributions based on archaeology (e.g. the study of cisterns in calcium rich rock, and how water availability influenced ancient settlement patterns), urban awareness of water (aqueducts bringing water to cities, the multifaceted study of fountains in cities), to water use studies and present day political science. This serves to support an orientation that people should naturally participate in water governance.

The Mediterranean, with over 500 million people in 25 countries (Laureano, 2008), is also a water scarce area (El Moujabber, 2008; Allan, 2001), and in some areas such as the Middle East and North Africa, subject to inter-nation conflict.

Two historic events in 2000 sent a policy pulse through the Spanish water sector. The first was a decision for a big water transfer from the Ebro basin to the Mediterranean Spanish coast. New actors entered the debate: people affected by hydraulic projects, citizens movements, green groups and “a considerable part of the academic community”. “All the actors demanded more public participation in the decision making process and a greater consideration to the environmental, social and cultural issues of water and aquatic systems” (Fernandez, 2008: 59). One result was the creation, in 1998, of the Iberian Foundation for a New Water Culture, which brought together not only Spanish and Portuguese scientists and water experts from very different disciplines from engineers and ecologists to jurists and economists” (2008:59). The second was that the European Water Framework Directive was passed, based on a paradigm similar to that promoted by the foundation: achieving a “good ecological status for all aquatic systems, integrated management of water (surface, coastal and groundwater), watersheds as management units, public participation and full cost recovery”.

Fernandez reports on the European Declaration for a New Water Culture (in 2005), which states that “... the idea of science and technology as tools for ‘dominating’ nature and for feeding a development based on limitless growth in a limited world... is giving way to a more mature outlook... which studies the complexity of nature so as to work out a sustainable approach for our development” (2008: 61), and foresees that this new culture will spread into other parts of the Mediterranean.

The MELIA workshop and subsequent publication presented two frameworks. The “conceptual frame on water culture” is explicitly intended “to raise public awareness on sustainable water management in the Mediterranean basin” (Laureano et al., 2008). The framework identifies four dimensions that enable us to understand public debates about water:

1. Affective dimension – the feelings people express about the consumption and distribution of water, e.g. is there a problem of water scarcity and what are the causes?
2. Cognitive dimension – who has what knowledge about the water cycle and its stakeholders?
3. Conative dimension – degree to which people approve or disapprove of measures to regulate water management and distribution.
4. Active dimension – how individuals and groups of citizens behave with regard to water consumption (Laureano et al., 2008: 118-199).

A separate “conceptual frame of water conflicts in the Mediterranean” was also presented (Shatanawi et al., 2008). This framework – after defining basic concepts, essentially the difference between “conflict” (incompatible goals) and “disputes” (Shatawari et al., 2008: 206), brings together a list of causes of conflict:

1. climate and water distribution,
2. water use and demand,
3. rapid development in irrigation projects,
4. overlap or lack of responsibilities,
5. insufficient maintenance,
6. inadequate finance,
7. poor management,
8. lack of law enforcement,
9. lack of awareness (2008: 207 -210).

A list of mitigation measures is also proposed:

1. Water transfer,
2. Policy, strategy and action plans,
3. Better management of existing water resources,
4. Development of a hydrological plan,
5. Environmental Considerations and Cost-Benefit Analysis,
6. Awareness in the field of water,
7. Ancient water technique for security and a sustainable future (2008: 210 -212).

While the topics suggest rich material and important research questions, the collection remains a multidisciplinary work, without development of synthesizing theory. The contributions restrict their study of water conflict to in-country conflicts, and the explosive issues between Israel and Palestine do not come into view. Social sciences do deal with political questions, but this collection shows that in politically tense situations there can be a chilling effect on water researchers, and political explorations may be avoided or muted.

5.4 Water Alternatives

The interdisciplinary journal *Water Alternatives* presents a body of work with a strong and dynamic theoretical base. It was launched in 2008 with a manifesto (see appendix 3), expressing the ambition

to address “the full range of issues that water raises in contemporary societies” and “to provide space for alternative and critical thinking on such issues”. Its initial list invited contributions on:

- Water policy at global and national levels
- Water governance and water reforms
- The politics of everyday water management (irrigation, watershed, etc.)
- Water knowledge systems, concepts and discourses
- Water and economics
- The politics of water provision and use
- Water, environment and society
- Water, technology and society
- Water, globalization and geopolitics
- Water, power and social divisions: gender, class, ethnicity.

It is impossible to give a fair overview of this body of work over 5 years in 14 issues in this report, so a few examples are presented here to illustrate the range of issues, the effects of strong theory and some interesting explorations these researchers have undertaken. The journal has attracted and built an epistemic community, with a shared technical vocabulary and dense internal referencing, which allows the contributors to build on each other’s work.

The journal has pushed the boundaries of discussion in important areas that are also relevant to South Africa. A number of articles look at the relationship between policy makers and researchers (Cleaver and Franks, 2008, discussed above). A recent issue has focused on the role of corporate water entities in policy making. Others undertake a critical analysis of the terms used in the water sector, for example water narratives, nirvana concepts and models (Molle, 2008).

A specifically South African political discussion is Larry Swatuk’s article on how the new democratic state under the African National Congress followed on a succession of other states and their water demands since the first colonial East Indian Company, which was also the world’s first multinational (Robins, 2006). After a comprehensive political history of water in South Africa, he concludes that the current government “despite the difficult challenges presented by a mostly arid climate, (is)... 'adding in' the water demand of millions of people, but not 'allocating out' those privileged under other constellations of social forces as they contribute most substantially to economic growth” (Swatuk, 2010).

Gender is the central concept in a fascinating account – based on two decades of experience and in depth reading of other research – unpacking “masculinities” among water professionals, officials and users (Zwarteveen, 2008). The South African water sector could benefit from a similar unpacking of unspoken gender politics not only at grassroots level, but also in policy and implementation practice.

The elite capture – and often enough subsequent failure – of rural water projects as a result of the gap between a one-dimensional project logic and the reality of multiple water uses on the ground is

thought provoking (Van Koppen et al., 2012). South Africa has a Multiple Use policy for rural development, but it is not yet widely implemented.

Projecting political desirables into the pre-colonial past is convincingly countered in an analysis of the history of construction, maintenance and control of Karnataka irrigation tanks, from the perspective of subaltern or marginal community members (Shah, 2008). Again, this is important for South African researchers as they reach into the past to define indigenous water knowledges and practices.

Despite the importance of the Minerals Energy Complex in South Africa (Fine and Rustomjee, 1996), there is a dearth of attention to the social and political aspects of an “extractivist” economy in South Africa. It could benefit from the attention of researchers to how, as Budds and Hinojosa (2012:119), writing about Peru, investigate how “the mining industry’s thirst for water draws in and reshapes social relations, technologies, institutions, and discourses that operate over varying spatial and temporal scales.”

Recent issues have focused on water grabbing (where powerful actors grab control over water resources and in various ways diminish or extinguish the water rights of others), the involvement of business in water policy making and water governance, and water governance at different scales. The Water Alternatives present a rich body of work that could spark interest in similar research in the South African water sector.

These three case studies suggest a number of directions in which South African social studies of water could develop. The Southern African hydropolitics collection illustrates the rich material available in the South African water sector, the diversity of viewpoints in the country, and the need for strong theoretical frameworks to understand its history and dynamics. That integration is still in its early stages, and still provides space for serious work in South Africa. The Mediterranean case studies show that alternative frameworks – in this case a framework emerging from people’s relationship with water from the grassroots up in an area where this has long been established in popular culture – are available for thinking through how to conceptualise social science projects in the water sector. The movement-like and successful initiative of the Water Alternatives shows how a strong intellectual political project (strong enough to be expressed in a manifesto) can attract creativity and productivity from social scientists in the water sector.

Chapter 6: The SA Water sector as a research area

6.1 The SA Water Sector seen as a laminated system

In this chapter, we consider a range of current and potential research questions, and how they are arranged across the different levels of the seven-layered system developed by critical realists (see discussion in chapter 3, sections 3.6 and 3.7 for technical terms in this system). This approach is as much interested in questions going across levels, as in the questions that belong on these levels and the disciplines that are best equipped to tackle them. The laminated approach also assists us in identifying underlying mechanisms. These mechanisms, which are operant in social-ecological systems, are not restricted to specific levels. They operate across them, and it is in these interfaces and transitions that potential policy answers to effective interventions may often be found. While the material and the social are always intertwined, in the discussion below we focus on the contribution, real and potential, of the social sciences to the South African water sector on these levels.

The laminated approach may make it seem as if these levels are separate, but in reality they are not – our understanding of them is often contained at specific levels, and the propensities of certain disciplines are to work at and produce knowledge only at specific levels. But the mechanisms of social dynamics that are important to policy and public debate operate across these levels, and therefore research questions should too. This is clearly illustrated in the moments of the policy cycle which proceeds from (1) agenda setting (agendas of national and subnational groups) to (2) policy making and legislation (both of these operate on an international level with received discourse and legal models, as well as the national level of public and parliamentary debate), to (3) the building and maintenance of institutions, which are both national and local, to (4) project design and funding, a professional and administrative activity to (5) implementation which can be decidedly local and materially determined by local contexts, to (6) evaluation within formal evaluation but most importantly evaluation by the affected mostly local communities and individuals, within the available international water discourses), which restarts the cycle of policy agenda setting.

The global level (vii)

The South African water sector is an open system. It is responsive to international water discourses, partly because of the timing of its democratic transition in the early 1990s (Swatuk, 2008). This can be seen in South African knowledge of and commitments to international best practice, and the principles of Integrated Water Resources Management and other approaches that were articulated in the Dublin, Mar del Plata and other international conferences. On this level, the South African water sector has faced – and learnt from – a number of obstacles encountered in implementation. Recent developments including the UN acceptance of a human right to water, has meant that South Africa's pre-eminence as a policy innovator has been challenged.

South Africa's openness to the world on this level is also reflected in its involvement with neo-liberal approaches (albeit a home grown variant) which influence policies in the water sector (Swatuk 2008), while at the same time participating in discussions on alternative approaches both as a result

of its historical trajectory, and network with countries with a more socialist persuasion. The influence of these international discourses on South African policy – and the South African influence internationally – have not received the research attention from the social sciences, such as political science, that could be reasonably foreseen.

Global change, and in particular climate change with its anticipated effects in a water scarce country would also belong on this level. While the impact of climate change on the water sector has invited research, there is much less on the mitigation aspects – the ways in which the SA water sector is responsible for climate change through its technology choices.

On this level, the social sciences have much to contribute, especially the political and economic sciences, as well as the fusion of earth, life and social sciences discussed in section 4. But as argued above, these questions cross into the other levels of research.

Level of whole cultures and traditions (vi)

South Africa has been deeply marked by the processes of colonization over at least 300 years, the Minerals Energy Complex in Southern Africa with its attendant migrant labour practices. These are regional phenomena, as was apartheid, the struggle against it and the reconstruction that follow on it. Water played an important role and was shaped by it in terms of water rights, the impact of mining and industry, and population movements relative to water availability. The “replumbing of the catchments” (Pearce, 1992) bringing water to Johannesburg and other regional centres, stands as an ongoing example. The social and political dynamics of transboundary water resource management would be researched on this level.

The macro-level orientated to understanding the functioning of whole societies or their regions (v)

As a society in transition, many research questions find their natural place at this level. Nearly two decades into its existence as a democratic society, South Africa is still in a process of ongoing transformation towards social justice in a participatory democracy. South African legislation intends a radical national transformation in water resources management, access to water and sanitation, water quality, and health (Stein, 2002). This is clear from the Constitution, water legislation and related environmental legislation. In the water sector specifically, the following developments have put the sector on the path to social and environmental justice:

1. The commitments to water for all in the Reconstruction and Development Programme (RDP), the National Water Act (36 of 1998), the Water Services Act (108 of 1997), the free basic water policy and policy and legislation on local government. This has been followed by hard work in national government, local government, communities and civil society to make these promises a reality. While there are debates about service delivery standards, sustainability, statistics and cost recovery measures, the underlying thrust of dramatically increasing access to water for South Africans is clear.

2. The removal of water ownership from riparian landowners, making it a public resource under custodianship of the state, and using a licensing or permitting system as the main mechanism for allocation.
3. The creation of the human and ecological reserves, guaranteeing the rights of people and eco-systems to water.
4. The principle and practice of stakeholder participation in decision making areas from catchment management forums (or sub-catchment forums), decisions about dam building following the World Commission on Dams (WCD), and water policy making in general.
5. The emphasis on environmental sustainability of our water use and resource management as well as developments in water quality management.

However, this transformation takes place against the background of several constraining factors: a lack of capacity and skills especially in local government, the endurance of privilege of bigger water users from the apartheid era, very slow reallocation of productive water, slow building of catchment management agencies, and limited participation of marginalised groupings in water governance.

South Africa presents a dynamic environment as a national water system in which the potential of these progressive intentions and policy positions come up against the momentum of past dynamics and the pressures of the international system in which South Africa finds itself. These questions should be set within the realities of our geography, namely the overall scarcity of water, more intense in some regions (to the West of the country) than in others.

The meso-level concerned with sub-national institutions and functional roles (iv)

Local government features large at this level because it carries the constitutional mandate not only for water services, but also is expected to fulfill a developmental mandate which amounts to nothing less than reversing the inequalities that were entrenched through the mechanisms of colonialism, migrant labour and apartheid, that operate on a large scale level (vi in our schema). Researchers would therefore need to work at both the level of the institutions as they function today (and there have been many projects designing, redesigning and improving local government, or devising ways to relieve it of mandates that fail) – and at higher and lower levels. Questions of skills and capacity (for example engineering and asset management skills in local government) operate both at an institutional level (what are the plans for training and further study) and on the level of the individual (levels ii and i, see below) where issues of motivation, individual career and learning as an individual would be the research topics).

The micro-level studied, for example, by ethnomethodologists (iii)

Typical research topics at this level are studies of community projects and community organisations, what motivates people for example to establish food security for their communities, or how they

respond to water infrastructure. Careful studies at this level can provide invaluable understandings of community dynamics and explain why certain policies are needed, or why policies work or don't work. But in keeping with our arguments throughout, reality is not conveniently arranged for research at single levels. Clearly, the capacities, attitudes and behaviour of institutions such as local government, traditional authorities, regional authorities are also relevant here.

At this level, it is also very clear that engineering understandings of water systems, their limits and capabilities, knowledge of water resource availability as well as the political dynamics that see these as malleable by social and political forces, need to be understood together. It is from this level that studies about Multiple Use Systems arise – but as we argue, these studies also reach into other levels, including what is acceptable practice internationally and in the professions responsible for water planning and management. Group interaction and dynamics at this level can be approached through a number of social sciences that have developed strong traditions of study, such as anthropology and sociology. Dealing with context properly is encouraged by the immediacy of data at this level, which can often be obscured through aggregation at higher levels, which is needed for policy formulation and debate.

This level – and the two below it – are also seen as the levels where human agency is important.

The individual or biographical level (ii)

Often an array of societal forces are reflected in the biography or career of an individual person. The perspective of an individual life can highlight these with great narrative effect and credibility. Some research has been undertaken on prominent individuals in the water sector, but the larger potential remains untapped. It is also important to link biographies back to widening contexts. Not only well-known individuals, but also the logic of people in households, which can be approached through gender studies, are important to understand how people use, waste, conserve and manage water. Another question that has interested the WRC would partly be addressed at this level, the issue of volunteerism.

The sub-individual psychological level (i)

Here researchers deal with how events and mechanisms are understood. Narrative analysis can make a strong contribution here, as can surveys of perceptions, supported by qualitative understandings of how these perceptions come into being and persist. Value systems, belief systems, and aspects of local and individual knowledge can also be tackled at this level. Some health issues will find this a relevant level.

Tracking mechanisms across levels

The laminated system can be used as a diagnostic tool for past studies, in the planning of future research and in coming up with a synthetic theory that can explain the different evidence emerging at different levels of the lamination. Many local government studies, for example, have focused on a

meso-level of institutions but remained stuck there, and as a result proposed solutions such as redesign of institutions while in a multi-level analysis, also investigating solutions on “higher” (macro-economic) and lower levels (career pathing, skills and attitude issues) more appropriate policy solutions could have been found. Mapping a research question – and the theories and methods proposed to answer the question – across all the scales of a laminated system might be very helpful in identifying research gaps that may result from the blind spots of individual disciplines on their own.

6.2 The importance of history in the SA water sector

We have earlier argued the importance of history as a sometimes unseen but nevertheless very real force. All the social sciences have some connection to a historical perspective, as social reality is always dynamic and changing. As could be expected in a rapidly transforming society with a troubled and highly unequal past, the momentum of past arrangements in South Africa still intrude on the present, while the new democratic space also brings with it different understandings and approaches, sometimes leading to robust debate and contestation (Swatuk, 2008). A quick survey of our water history shows the following:

1. Archaeological research shows that human settlement in the stone and iron ages was determined by the availability of water and rainfall.
2. Political economies of pre-colonial societies and states in Southern Africa were determined by access to natural resources, such as water. Anthropologists argue that where water was abundant, settlement patterns showed dispersion into households, and where it was scarce, large urban centres developed, with consequences for cultural patterns (Hammond-Tooke, 1993).
3. Colonial settlement led to dispossession of indigenous people from well-watered land, culminating in the 1913 Land Act and carrying forward into the delimitation of the bantustans.
4. The riparian right to water linked access to water to land ownership, thus intensifying water inequality (Swatuk, 2010).
5. The focus of government in water provision was agriculture, as witnessed by the early name for the Department of Water Affairs and Forestry (DWAF), “department of irrigation” and the 1912 water law (the Irrigation Law). The construction of dams like the Gariep and Vanderkloof (and many others) was primarily for irrigation.
6. The 1956 Water Act made provision for municipal and industrial water use.
7. Under apartheid, access to water was used as a means of creating legitimacy of unpopular governments in the “homelands” or “Bantustans” since the 1950s.
8. Pollution legislation lagged behind developments in other industrial societies, where the 1970s saw a flurry of water pollution legislation (Weale, 1992).

9. Payment for local government services, including water, became a focal point for political mobilisation against the apartheid government in the 1980s.
10. The 1992 drought revealed the devastating effects of inadequate water access in South Africa's rural areas, particularly the "homelands".
11. Policy and legislation since 1994 set out to systematically correct the above problems, in an ongoing process to which this research strategy intends to contribute. Important recent documents include the Water Resource Management Strategy and the Strategic Framework for Water Services (DWAF, 2003). The framework consolidates strategies to decentralise water services to local government, and ensure that a participatory, regulatory framework can develop. It points out that the water sector in South Africa has set itself targets in excess of the Millennium Development Goals. A current process of water allocation reform as well as a longer-term transfer of water allocation function to catchment management agencies are systematic ways of tackling the issue of unequal access to raw water.
12. South Africa has inherited an extensive, well-developed and well-organised water sector with cutting edge engineering and other technological skills. The sector wide approach has strengthened this through institutions like the Water Sector Leadership Group, and the Masimbambane Programme. The WRC, with its mandate of dealing with the challenges of water scarcity through developing knowledge, has played a big part in this, but other initiatives like the Water Institute of South Africa, various university departments, consulting firms, people in government and non-governmental organisations (NGOs) have also provided a strong base for the water sector.

For social researchers, this history should serve as an inspiration to contribute to the further development of the sector through research – and a rich source of empirical material.

Chapter 7: Water research institutions in South Africa

A scan of water research institutions was undertaken in order to understand the approaches of water research institutions to social research, and their capacity for social science research into water. The scan included universities, and private and parastatal research institutions. It was accompanied by a survey of individual researchers working in some of these institutions, to elicit their views on the current state of social and interdisciplinary research, and research priorities.

The process also served to identify participants for the national workshop in August 2013.

7.1 Methodology

The principles of a community of practice framework determined much of the methodology for the institutional scan. During the research, a number of people surveyed, as well as reference group members, suggested that the term “social researcher” be defined more closely. This could be done, for example, by using Max-Neef’s framework for transdisciplinary work (2005). This would create a core group of sociologists, anthropologists and other core social sciences, a group of applied sciences like law and economics, and a group of non-social scientists interested in working with social scientists.

But the researchers were reluctant to do so for three reasons:

1. the principle of self-reporting, according to which respondents would decide themselves whether they are social scientists or not
2. the strong finding (during research for the discussion paper, deliverable 1) and generalized consensus that a social agenda in the water sector would be an interdisciplinary one, and that the main question is how social and non-social scientists work together, which led to
3. the organizing principle of the emerging community of practice – starting with the reference group – of a mixed group of social and natural scientists whose main aims are to define a holistic water research agenda, and develop ways of working together better in interdisciplinary teams.

Secondly, what does “capacity for social research in water” mean? Its precondition is training in social research, thus in a social science discipline. But this may be limited by interest, by time available, by opportunity or funding. How does one operationalize this concept in a scan? The method followed below was according to the principle of self-presentation, either statically on websites, or in interviews with researchers involved in these institutions.

Because the scan was based on the Community of Practice approach, as explained in Chapter 1, the method was to identify already connected networks of social researchers through a snowball effect, as a form of peer identification of other social researchers, and record their details in a register.

Universities and other institutions were scanned for signs of interest in social water research. The first step was an internet search with the words “social water research” and its variants, “water research” or “water institute”. Together with telephonic interviews, this yielded a description of a

landscape of institutions. The telephonic interviews were also used to augment the register of social and allied researchers, by asking for names of social researchers working with or known to the representatives of such institutes.

The register was used to send out a survey questionnaire, which had been developed with inputs from the reference group. The questionnaire was designed to provide information about the institutions of the researchers, the researchers' areas of interest, and also to provide access to (names and addresses of) other social researchers. Two logics informed this approach: the one was self-reporting, e.g. of research interest areas (the standard in academic practice) and a logic of building from a known core (the reference group) to researchers known to them.

However, the return rate was only 20%. Why? In a number of telephone interviews, respondents explained that they regularly ignore or delete survey requests, because they are simply overloaded. Some researchers also reported that they consciously resist being drawn into new ventures, again because they already have too much work. This is a factor that needs to be taken into account in future work.

The scan resulted in three products:

- a register of all people who were contacted, a total of 70, that can serve as the basis for future communication including invitations to the June workshop;
- a survey of 12 people who provided detailed information;
- a scan of institutions doing social research into water.

7.2 Survey of individual researchers

A total of 14 individuals responded to a survey. While a small sample (20% response rate), the surveys nevertheless give a qualitative insight into the views of some social researchers in water. In the material that follows below, the original wording from the respondents is preserved with only minor editing. Respondents were from universities (6), 4 NGOs (4) 2 parastatals 2; (WRC and CSIR), consultants (2). All 14 participants wanted to attend the workshop.

The respondents were asked the following questions:

A. Views on social research in the water sector

1. What do you see as strengths in current water sector research?
2. What do you see as gaps or weaknesses in current water research?
3. What do you see as priorities in South African water research?

B. Organisations (Universities, parastatals, NGOs, research consultancies)

1. Is your organisation currently engaged in social science research in the water sector? If so, what are you engaged in?

2. Has your organisation done social science research in the water sector? Please list what research your organization has done and any partners that were involved in the study? Who funded the study? Please, provide some titles of publications. Was there uptake of findings?
3. Does your organisation plan to undertake social science research in the water sector? Please elaborate.
4. Do you mainly work on your own as social scientists, or in interdisciplinary teams? If the latter, what are your experiences with such an integrated approach?
5. Would your organisation be interested in attending a gathering of social and interdisciplinary researchers in water?
6. Who in your organisation will take the role as contact person for this project? Please provide contact details (e-mail, phone, website).

C. Individuals

1. What are your (overall) research interests?
2. What field(s) of water research are you interested in?
3. What is your experience in doing social research on water?
4. What are your qualifications?
5. What are your relevant publications?
6. What is your experience of interdisciplinary research?
7. What research methodologies do you use for water research?
8. Would you be interested in attending a gathering of social and interdisciplinary researchers in water?
9. Please provide contact details (e-mail, phone, website).

D. Snowball

Please suggest any other researchers or research organisations that may be interested in this project and provide their contact details.

E. Any other ideas

Please send any ideas, suggestions or reading material that may be relevant to the project team.

The detailed results of this survey are presented in annex 4, but the following conclusions were drawn from it:

1. The survey confirmed the need for more support to social and interdisciplinary research. It confirmed that many social scientists enjoy and benefit from interdisciplinary research. It

also expressed confidence in the importance of social theory and social methodologies in the formulation of research questions. It is clear from the survey that there is some frustration with the role the social sciences play in the sector currently.

2. The respondents overwhelmingly pointed out the importance of the WRC and specialized funding for water research. They are generally impressed with the quality of the natural science and engineering based research in the WRC.
3. A striking feature was the emphasis on practical usefulness of research, allied with a parallel emphasis on empowering communities to understand and monitor service delivery and water resources.
4. However, there was much criticism of how much the research is used in practical ways.
5. Finally, the examples of work by the respondents in this small sample indicated that there is already a sizeable production of social research.

7.3 Scan of capacity and interest in institutions

Four different types of institutions were scanned: universities, parastatals (such as CSIR), research consultancies, and NGOs. In the sections that follow, self-descriptions were drawn from websites, telephone interviews and electronic communication. Quoted text is not differentiated by quotation marks, as the object of this section is to present, as it were, the self-representations of these institutions.

Cudywat, NWU Vaal Campus

The Research Niche for the Cultural Dynamics of Water, Cudywat, was established in 2006 under the leadership of prof Johann Tempelhoff, a historian who conducts research on contemporary water issues (Tempelhoff, 2011). It was an explicit attempt to promote transdisciplinary research and was closely linked to a new (2006) transdisciplinary journal: TD. The Journal for Transdisciplinary Research in Southern Africa.

Cudywat was formed on the Vaal Campus of the Northwest University with Public Management and Governance, Political Studies, Information Communications Technology and Disaster Studies as major stakeholders. It focused on “water hot spot” research and produced transdisciplinary, field-work based studies in areas around the campus. These include

- Report on the water related problems of the Kgetleng Local Municipality (Koster) in Northwest (2006)
- Perspectives on Emfuleni’s aquatic commons: a qualitative study on the Vaal River Barrage”, (2007),
- An investigation into the environment health of the Vaal River in the vicinity of Parys (2008)
- The problem of irrigation from Lesotho Highlands water in the Liebenbergsvlei River catchment, Eastern Free State Province” (2009)

- How civil society took over some operations of a local authority in the North West Province town of Sannieshof, in the Tswaing Local Municipality (2009)
- “What about the votes? Water, sanitation and civil disorientation: the case of Maluti-a-Phofung local municipality (Harrismith)” (2010)
- Rediscovering water roots: the consequences of nickel mine prospecting in the Groot Marico River region, South Africa” (2010)
- The Potential of Civil Society Organisations in monitoring and improving water quality, focused on three Upper Vaal catchment forums (2011)
- When taps turn sour: the 2012 acid mine drainage crisis in the municipal water supply of Carolina, South Africa (2013)

The research to date has been as practical as possible, and a number of projects were either commissioned by local authorities and/or used by them in planning immediate interventions. The centre also involved, on principle, officials of local authorities as well as members of civil society, in its research teams. Cudywat is also involved in the Akili project.

“The face of water” at Pretoria University

The main purpose of the Water Institute, Water at UP, is to encourage advanced water research and education across boundaries in all nine UP Faculties, in other words, to be “the face of water” at the university. This strongly positions the Water Institute to constructively contribute, through its structures and external involvement, in finding solutions to Africa’s Water Challenges. The institute defines itself as

- An internal platform at UP where the excellence of UP researchers and teams is supported and strengthened,
- The institutional face of water-related research, teaching and learning, and community engagement at UP that facilitates coordination at all levels
- The UP coordinating entity that cooperates, through fundamental and goal direct research, with national government, local communities and other stakeholders to find solutions for water-related challenges, encourage technology transfer and promote human resource development
- A facilitator of UP research partnerships and alliances with entities in South Africa, Africa and abroad to address major water-related issues in Africa.

While the water institute is currently mostly doing work in the natural sciences, there are two specifically social directions developing. The one is studies into adaptation to climate change, with special attention to the role of indigenous knowledge. This will include a conference on the topic in October 2013. The other is a developing interest in the politics of water, led by Dr Sandy Africa in the political sciences department (interview with prof Hannes Rautenbach, April 2013). Current projects include decentralization of water governance in Africa, and investigation in Pretoria’s hydrological heritage (the Fountains).

The UP Water Institute is entering an alliance with Rand Water Academy for joint research and supervision of students. The aim is to produce practical knowledge.

UWC and the anthropology of water

The Institute for Water Studies (IWS) at the University of the Western Cape was formed in 2009 with the goal of promoting research, postgraduate training, and outreach on water-related issues through the collaborative efforts of UWC staff and students. The Institute for Water Studies aims to increase the understanding of linkages between surface water, groundwater, and ecosystems, and how water users are affected and affect these linkages.

Within the IWS, is the Anthropology of Water, a working group at University of the Western Cape comprised of Professors, PhD and Masters students, interns as well as working professionals who have an interest in water and society.

The group strives to achieve exemplary statistics and interdisciplinary work focused around water and to become known nationally, regionally and globally. The WoA publishes papers in a wide range of topics but all have in common a focus on water, poverty and development. The WoA is particularly – but not only – interested in the Capability Approach (CA). The WoA encourages south/south and south/north engagement in water related issues.

The Capability Approach (CA) was developed by the Nobel prize winning economist, Amartya Sen (1999). The main premise of Sen's (1999) 'Development as Freedom' is that individuals achieve freedoms – or fail to – because of social, political and economic constraints or opportunities. Pivotal to the CA are the ideas of capabilities (opportunity) and functionings ("doings" and "beings"). Put more simply the CA is concerned with the way in which people are able to do the things they value doing and be the people that they want to be. This is achieved through opportunities that enable the "doings" and "beings".

AOW has taken on this framework to explore the human dimensions related to water, poverty and development. The CA allows for a multi-dimensional approach to poverty because it engages with multiple domains or dimensions of development. In short, it is well suited as a theoretical framework that can evaluate water projects, water policies and social arrangements around the management of the resource.

The CA framework is used 1) to define people's well-being 2) to assess social arrangements and 3) for design and evaluation of social interventions, social arrangements and policy interventions. It is "...an intellectual discipline that gives a central role to the evaluation of a person's achievements and freedoms in terms of his or her actual ability to do the different things a person has reason to value doing or being" (Sen 2009:16).

The WoA works closely with PLAAS, the Institute for Poverty, Land and Agrarian Studies, whose projects also include social research into water – currently Barbara Tapela water service delivery protests.

Stellenbosch University Water Institute

The institute is a multi-disciplinary research centre, set up in 2010. The Institute functions across various faculties of Stellenbosch University, such as Science, Engineering and AgriSciences. Research

is done in collaboration with government and industry to solve water related challenges, to provide technology transfer and to develop human resources.

Its main current focus seems to be on technical topics such as the safety of agricultural produce, biofouling and biocorrosion control, filtration, endocrine disruptors, hydrodynamics, water engineering, catchment and resource management, invasion biology, and the geochemical evolution of water and waste waters. However it also addresses the ethics of freshwater management ownership of water, community health, financial-economic planning of water use, and water governance and management.

In a telephonic interview Prof. Johan Hattingh, dean of Arts and Social Sciences and closely involved in the social side of the water institute, said that the Water institute at Stellenbosch is very involved in social aspects of water – the economic, political, social and sustainable aspects of access to and use of safe water. The institute is not only interested in technical issues, but also in how water functions in a social context, in terms of value systems and of power relationships. The institute involves staff from the departments of sociology, anthropology, history, politics and philosophy. It also draws in the Sustainability Institute (at Spier).

University of the Free State

Prof Maitland Seaman heads the University of the Free State's transdisciplinary Strategic Cluster "Water management in water scarce areas", with the vision of create sustainable solutions to water use challenges in order to improve the quality of lives in the water-scarce areas of (sub-Saharan) Africa (and, where feasible, more globally. The following complementary focus areas contribute to the central vision:

- Water-use Governance
- Conservation of Aquatic Ecosystems
- Conservation of Groundwater
- Conservation of Soil water
- Adaptation of water use to climatic variability and change
- Optimal water-use for Food Security
- Optimal water-use in closed basin systems
- Optimal urban water-use (Water Engineering & operations)
- Protection of water sources (Human Health and water-borne disease).

Prof Maitland (telephone interview and electronic communication) explained that the UFS has had a long (30 year plus) history of water research, on groundwater, freshwater ecology and agriculture in particular, preceding the establishment of the cluster in 2009. The cluster has hosted four successive annual Orange Basin conferences.

Also at the Free State University, Prof Doreen Atkinson heads the Arid Areas Research Programme, which focuses on socio-economic development in the arid areas, the under developed hinterland of South Africa, Botswana and Namibia. In South Africa, the Karoo straddles four provinces: the Western Cape, the Northern Cape, the Eastern Cape, and the Free State. In Botswana, it includes the Kalahari, and in Namibia, the Namib Desert.

The programme currently focuses on the social sciences, but actively seeks to promote linkages with natural scientists, especially in the context of the effects of global warming on arid areas – which are likely to become even more arid – and therefore on livelihoods and poverty. Water plays an important role in this.

University of the Witwatersrand

The University of the Witwatersrand has a number of groups working on water. The Water Research Group is focused on water engineering, and the Centre for Water in the Environment (CWE) is an interdisciplinary research centre of fluvial geomorphologists, ecologists, hydraulics engineers and water policy and natural resource management professionals, which integrates disciplines for better understanding of rivers and wetlands, and adaptive management systems that integrate science, stakeholder needs and management to meet South Africa's innovative water and environmental legislation – making sure that science is used, not just useful. (Kevin Rogers...)

The Global Change and Sustainability Research Institute (GCSRI) at Wits, is a new institute launched in 2011. Its focus so far has been on research proposals in the area of food and water security.

The GCSRI focuses on the science-society, science-policy interface in the energy-food-water nexus. Questions addressed are how a virtual stakeholder table can help to increase participation of stakeholders in the deliberations, how a democratizing of knowledge can lead to better informed deliberations, and how gaming can help to foster successful negotiations of CoIs. It also focuses on improved observations of water resources, water management, and water usage, as well as avenues to ensure that the knowledge created is being used by societal stakeholders. Research agendas include:

- Global Change adaptation and mitigation
- Biodiversity, human health and nutritional status of rural communities
- Sustainable urban living through improved water, waste and energy management
- Pollution, extraction and ecosystem health
- Action research on environmental policies
- Improve innovation policy-making effectiveness and support cross field collaboration between environmental, science and technological agencies

The institute is concerned to improve the science/society interface, and improving evidence-based water management. It is part of the Limpopo Basin project, where it is focusing on understanding how stakeholders interact. It also looks at water security in informal settlements. It follows an issue based approach because it is interested in developing knowledge needed to serve society. It believes in the co-creation of knowledge.

University of Cape Town

UCT does not have a water research institute, but has been considering the idea for some time. However, there are many units doing water work, including the Freshwater Research Unit, and urban water management, which looks at water sensitive urban design and works directly with care of urban rivers.

A specifically social science based research programme is in the department of anthropology. In Anthropology, Mugsy Spiegel busy with anthropological investigation in collaboration with civil engineers, environmentalists and planners, concerned with the social dynamics that arise around wastewater reticulation and related drainage processes, especially but not exclusively in informal settlements on the edges of South African cities.

University of KwaZulu-Natal

The UKZN has wide and varied expertise and experience in water-related teaching, research and outreach activities throughout South Africa and in many parts of Africa and beyond. The research focus area draws in a range of academics and students from all the University's Colleges and most of its Faculties. Hydrology research deals with agricultural water use and innovation in irrigation practices; water related aspects of land use change; hydrology process studies and hydrological aspects of climate change and forecasting.

The UKZN's Pollution Research Group is active in waste, water and sanitation management, working with the eThekweni Municipality. Its work includes dissemination of best practice of water and sanitation supply to unserved communities.

Applied research into and management of water resources, decision support tools for estuaries, fresh water management and water conservation is conducted by the Institute of Natural Resources, an associate institute of UKZN.

In addition to these larger water research groups there are several other initiatives, notably working on wetlands, soil erosion, community interactions and sanitation, estuary-related research, and water and public health.

The department of geography is engaged in research to develop systems of social learning that will yield socially robust water relevant knowledge within the paradigms of post-normal science. It is researching in the realm of citizen science and participatory agent-based social simulation modeling.

The Smallholder System Innovations (SSI) Research Project involves all UKZN groups. An applied and development-oriented research programme, it aims at advancing knowledge on how to balance water for food and the environment with a particular focus on upgrading smallholder rain-fed agriculture in water-stressed catchments. The multi-disciplinary research programme encompasses biophysical and social research themes, Grassland Science and the University's Farmers' Support Group, with the researchers working closely with other stakeholders, including local communities.

The UKZN is also the home of the exceptional Centre for Civil Society. The CCS has long produced research and trained researchers (not only students but also in civil society), with a strong focus of water services, water quality, climate change, environmental justice, governance, protests and political mobilization, the challenges of informal settlements, etc. It analyses events in the water

sector through a strong political lens and consciously shares the knowledge it creates with activists and communities affected by the challenges above.

Institute for Water Research at Rhodes University

The Institute for Water Research (IWR) at Rhodes University in Grahamstown is a multi-disciplinary group that contributes to the understanding and sustainable management of water resources in southern Africa. These objectives are achieved through fundamental and applied research into the structure, function and components of natural water systems and the dissemination of research results.

The staff of the Institute actively collaborate with other departments and institutes at Rhodes University including the departments of Geography, Zoology and Entomology, Environmental Science, Ichthyology and Fisheries Science, The South African Institute for Aquatic Biodiversity and the Albany Museum. The Institute also cooperates with other universities, state departments and private consulting companies, both in South Africa and internationally.

The Institute has expertise in several areas within the broad field of water resource science, including hydrology, integrated water resource management, freshwater ecology, water quality and toxicology, biomonitoring, the management of water services and community education. The combination of research and practical problem solving within the IWR allows recently developed research methods to be rapidly deployed for water resource planning and management. Within the field of ecology, the Institute has focused on understanding the processes and requirements of aquatic ecosystems and the effects of flow variability. Much of the work has been directed at assessing the environmental water quantity and quality requirements of rivers, an important component of the 'Reserve' determination process designed to ensure the sustainable use of water resources under the national Water Act of 1998.

This research has been supported by the IWR's long history (over 30 years) of research into the development and application of methods for analysing and modelling hydrological information for various water resource planning and management purposes.

The Unilever Centre for Environmental Water Quality (UCEWQ) focuses on ecotoxicology, biomonitoring and water chemistry. The Institute has also been involved in community water issues, including local government responsibilities for integrated water resource management and issues associated with the delivery of water and wastewater services. Part of this process has included community engagement and education.

Nelson Mandela Metropolitan University's Sustainability Research Unit

Nelson Mandela Metropolitan University's Sustainability Research_Unit comprises of a group of critical thinkers who focus on the sustainability and resilience of ecosystems and society, under the leadership of prof Christo Fabricius.

The challenges that SRU observe include adapting to climate change, managing invasive alien plants and animals, reversing land degradation, maintaining or improving river health and the ecological integrity of wetlands, coastal zones and estuaries, promoting good governance and decision making, implementing adaptive management and reducing inequality through benefit sharing.

SRU members aim to understand the processes, feedbacks and interactions that cause change, for example the interactions between people and their ecosystems across scales, how groups and individuals learn and adapt, how their thinking works, their barriers and bridges to adaptation, and the factors that lead to long term change in a positive direction.

Theoretical frameworks are in the areas of social-ecological systems, resilience, complex adaptive systems management, social learning, mental models, social network theory and landscape ecology. The methods used cut across academic disciplines, ranging from participatory research, content analysis, geographic information systems, soil, water and vegetation surveys, landscape ecology and modeling.

The SRU's inspiration is derived from users and practitioners on the ground. The members work closely with these practitioners and individuals in order to link the theoretical frameworks to practical solutions, and they continuously challenge everything.

University of Johannesburg – Water and Health Group

The Water and Health Group is comprised of a Water Research Group based in the Department of Civil Engineering Science and other water-related groups in the university, such as the Water and Health Research Unit. The Water and Health Group involves several researchers working on water research from different faculties at UJ and from other universities.

The research done by the centre deals with the relationship between water and human health, which argues that “no other advancement in the field of medicine and health have attributed more to increased lifespan and improved general health than access to safe water and improved domestic hygiene and sanitation”.

Access to and availability of good quality water are the key aspects of safe water, and supported by sanitation and domestic hygiene, forms a cornerstone of improved public health. It is therefore vital to understand this relationship. The Water and Health Research Unit researches the environmental health impact of inadequate or improved services related to Water, Sanitation and Hygiene in Southern Africa.

This approach supports the national priority of significantly reducing the impact of water-borne disease in the region. Target constituencies for research by the Unit therefore include government agents and service providers as well as members of communities – especially the rural and the poor.

Monash University

The Water Research Node at Monash South Africa focuses on the human dimensions of water and water management and has particular strengths in water governance. It has engaged in property rights issues research and are currently involved in exploring benefit sharing mechanisms in natural resource management. Monash University was involved in the NFEPA project, particularly the capacity building and implementation side, which was taking the technical aspects and information and transforming those through participatory processes with end users into guideline implementation documents.

Fort Hare, Nelson Mandela Bay Metro and the University of Port Elizabeth

The Universities of Fort Hare, Nelson Mandela Bay Metro and the University of Port Elizabeth are in talks to form an inter-university water institute. According to environmental sociologist prof Wilson Akpan, this future institute definitely plans to undertake social research.

DUT, CAPUT, Unizulu, Venda and Limpopo Universities

I contacted the universities of Unizulu, Venda, Limpopo, the Tshwane University of Technology and the Cape University of Technology. While they have hydrology or water engineering departments, they do not have water institutes, or undertake social research into water – except by implication, e.g. in rural development and community engagement. Researchers from these institutions have been included on the register.

Council for Scientific and Industrial Research (CSIR)

In water resource governance research, the focus is on knowledge generation in the areas of policy, governance, water resource planning and management approaches and socio-ecological systems (including human health). The objective is to ensure the equitable, efficient and sustainable deployment of water resources to support socio-economic development. The social sciences also participate in research on water infrastructure, planning water services and sanitation. In water ecosystems and human health research, the CSIR conducts multidisciplinary research to support the effective management of water resources to ensure that water is fit for use for man and the environment. The assessment of aquatic ecosystem processes, management, protection and function is undertaken to characterise the goods and services provided by the resource, and to determine measures of sustainable use. Skills range from approaches in water chemistry, hydrology, geomorphology, aquatic ecology and biology, and water resource planning to ensure the equitable, efficient and sustainable deployment of water resources to support socio-economic development.

Human Sciences Research Council

The HSRC has a unit devoted to governance and service delivery issues, including water. It also uses social sciences to do social attitude surveys.

Civil society

A number of NGOs undertake social research in water. The greatest output and involvement in social water research comes from AWARD, prominent in IWRM and working with stakeholders on the ground in the Olifants and Limpopo catchments.

The Mvula Trust, with a focus on rural water supply and rural sanitation in practice, but a much broader policy and research agenda, has undertaken extensive research on the basis of its project work in rural areas. Its focus has been on village water committees and various aspects of local government water supply and sanitation.

The Environmental Monitoring Group works on water services and climate change from a grassroots perspective, and supports the South African Water Caucus, a network of NGOs, community groups and activists, with information and research.

Imphilo waManzi in Durban does similar work in KwaZulu-Natal, and runs the water policy and implementation discussion list Bubbles. Imphilo waManzi and EMG worked together (with a range of

other stakeholders and contributors) on the Water Dialogues, which looked at municipal service delivery across a range of municipalities.

ASSET Research's specific research areas are:

- Fresh water supply, delivery and quality
- Energy, climate and air quality
- Coastal and marine resources
- Biodiversity and land use
- Food production and security
- Natural capital and the macro-economy
- Ecosystem health and resilience
- Development with care for people and environment
- Science-policy interactions

Consultancies

A number of consultancy firms undertake important policy and other water research, including for local government and the Department of Water Affairs. These include Pegasys, Umvoto, and the Palmer Development Group.

Analysis of the scan

There are many water institutes, one or more than one at every university. Where they do not exist, universities are considering creating them. They all do interdisciplinary work (some are transdisciplinary, while some are multidisciplinary), and most express an interest in intensifying that. Natural science and engineering still seem to dominate these institutes.

The institutes emphasise the need to and their intentions to work with concrete problems and find solutions to them. They also emphasise working with stakeholders and communities. These declarations point to an increasing need for social science.

It is also clear that the applied social sciences – law and economics foremost among them – are important. The scan as well as individual interviews however also revealed that the basic social sciences like sociology, history, philosophy, anthropology and geography contain individuals with an intense and growing interest in water. Often this interest is closely aligned to a general interest in “sustainability”.

It is noticeable that parastatals, consultancies and NGOs also contribute to social research.

Chapter 8: A gathering of social and cross-disciplinary scientists

8.1 Introduction

The workshop “Towards a social and interdisciplinary research agenda for the water sector in South Africa” in Kempton Park on 1 and 2 August 2013 was the final step in the project to encourage the participation of social science researchers in the work of the WRC and the water sector. The workshop aim was to move towards developing a social science research agenda for the water sector, while providing an opportunity for participants to explore issues around social research in the water sector that are important to them.

A process facilitation team (Reos Partners) was contracted to run the workshop to encourage interaction and participation, in the spirit of an emerging community of practice of social and interdisciplinary researchers. The full proceedings are included as Appendix 5.

8.2 Overview of topics of discussion

As it was the first meeting of its kind, a large amount of information was shared in the workshop. First, the setting of social research in the water sector was discussed.

WRC CEO Dhesigen Naidoo said that social research is a strategic priority for the WRC in its next 5 year plan. South Africa is doing well in water research (at no. 18 in the world, compared to its position as no. 33 in overall research output. WRC KSA5 manager Dr Inga Jacobs showed that the WRC already supports social research, and 38 of its current projects are led by social scientists. The National Research Foundation provides support to social research, and would welcome more social research applications.

Social research takes place in academic settings, where there has been great interest in social theory and methodology, as well as practical research and an emphasis on social learning. Consultancies do a large amount of social research, often very practical and oriented to implementation, and thus limited by clients’ needs. Non-government organisations (NGOs) do research that is needed by the communities they work with, and are great integrators of research.

Ten examples of experiences with social research were discussed in group settings (See Appendix 5 for detail):

1. The Dynamics of the Water Sector – Early Experiences (Dr Lynette Dreyer)
2. Ethics, social justice and human well-being: the Capability Approach and Integrated Water Resources Management (Prof Jacqui Goldin, UWC)
3. "No to extraction!" Action research around water and sanitation issues (Dr Mary Galvin, Umphilo waManzi)
4. The challenges of studying service delivery protests (Dr Barbara Tapela, PLAAS, UWC)

5. Anthropology of waste water, especially in informal settlements (Prof Mugsy Spiegel, UCT)
6. History, transdisciplinarity and emerging social water issues (Prof Johann Tempelhoff, NWU)
7. When social scientists are invited late in the process; The importance of including social scientists in research problem formulation (Karen Nortje, CSIR)
8. Tackling social aspects of IWRM, complexity, social learning (Jane Burt and Dr Harry Biggs, for AWARD)
9. A transdisciplinary project with the explicit adoption of a transdisciplinary framework. (Dr Tally Palmer, RU)
10. Nurturing a community of practice around IWRM research, a history (Eiman Karar, WRC)

Open Space Technology was used to create a number of self-organising opportunities to reflect on experiences of being a social scientist in the water sector and how to enhance and support the role of social scientists in the water sector. Some of the recommendations from participants were:

1. To build a community of practice of social scientists.
2. To use this community as platform to nurture the development of high quality and socially relevant social science practice in the water sector
3. To discuss and share methodologies and approaches
4. To plan and undertake collaborative projects
5. To support and guide the WRC in reworking its funding framework and research support and assessment process to be more in line with the needs of social science research and social science methodologies.

The following are the main discussions/needs expressed by the group;

1. Supporting and promoting social science in a science dominated sector.
2. Achieving better interdisciplinary co-operation between social and natural scientists.
3. Social scientists are motivated by wanting to make the world a better place, social injustice issues, environmental issues, democratic issues and inequity.
4. Developing an understanding of the role of social scientists by documenting the practices of social science in the water sector.
5. Supporting up and coming social scientists.
6. Motivating for and developing assessment and funding frameworks that are in line with social science approaches.
7. Some kind of dialogue with/ training/ support for funding bodies so they understand social science research in terms of motivation, focus, aim and methodology,

8. Supporting and developing strong social theory and practice.

Suggested way forward

In the final session participants suggested the following way forward:

1. Current workshop is a starting point for developing a community of practice. The aim is to bring people together, discuss experiences and realize the diversity of social science in the water sector.
2. The current project team will write up and disseminate workshop report.
3. A contact list will be distributed, with the brief biographies of participants.
4. A database or research directory will be developed linked to the updated WRC website. One mechanism could be to develop an interactive space on website.
5. A review of existing social research should be conducted by the WRC.
6. Development of social science forum. This may not only be WRC driven but rather a platform for social scientists with the WRC providing support and participating.
7. Social research conference would be one way to catalyse people into co-partnerships or starting joint research projects. The conference should be run according to thematic areas which work towards building some form of organisational structure for the Community of Practice.

Chapter 9: In conclusion

This project has shown that there is a definite need for social science, its theories and methods to understand social dynamics in the SA water sector, in the light of the ongoing transformation of the country and the water sector itself, the challenges in the water sector and the country's commitment to democracy. There are urgent social questions around poverty, gender and governance issues.

SA has a strong water research community. Encouraging social science and interdisciplinary work will strengthen it further. Investment in the research capacity is investment in an already advanced knowledge sector. The SA water sector has good water researchers, and this research ability should be encouraged. Social scientists should be active in formulating and promoting a social science agenda (in terms of process). This agenda should be shared with other scientists. However, the water sector is a fused reality of engineering, economic and social concerns, these are not separate. The best social research agenda is an interdisciplinary agenda.

Several WRC projects have already begun incorporating social science and interdisciplinary approaches. The social sciences and interdisciplinary components should be consciously strengthened.

A number of principles for good interdisciplinary work can be singled out:

1. Co-define the research objects and objectives to get most out of each type of science (how study objects are defined).
2. Practice conceptual hygiene – be careful about concept formation and its meaning (esp. social science where there are theoretical and philosophical bases to concepts)
3. Social science should produce both policy and public knowledge. This requires transparency and a dialoguing approach. It also requires attention to the positionality of researchers.

We could do worse than heed the following principles spelled out by Roy Bhaskar (Bhaskar, 2010: 20) for successful interdisciplinary research:

- “Disambiguation of ontology and epistemology (distinguishing between questions of what is real and what our knowledge of it is);
- Anti-reductionism;
- The idea of explanation in terms of a laminated totality;
- What may be called the holy trinity of interdisciplinary research: metatheoretical unity, methodological specificity and theoretical pluralism and tolerance;
- The dissolution of career, administrative and financial barriers to interdisciplinary research. (2010: 20)”
- “In addition, interdisciplinary research will require: A judicious combination of disciplinarity and interdisciplinarity in their education (working in 2 or 3 disciplines, especially one social

and one natural science), and a sense of a secure recognized place or home in a single disciplinary tradition (Bhaskar, 2010).

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<http://www.uj.ac.za/EN/Faculties/health/research/ResearchCenters/WaterandHealth/Pages/home.aspx>

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<http://web.mit.edu/newsoffice/2010/global-water-issues.html>

http://www.anthropologyofwater.org/?page_id=9.

<http://www.ssrc.org/about/>

<http://www.water-alternatives.org/>

<http://www.ecologyandsociety.org>

Telephonic interviews

Dr Marius Claassen, CSIR

Prof Wilson Akpan, Fort Hare

Dr Kevin Winter, UCT

Prof Maitland Seaman, UFS

Prof Hattingh, US

Prof Heidi Prozeski, US

Prof Hannes Rautenbach, UP

Prof Hans-Peter Plag, Wits

Prof Johann Tempelhoff, NWU

Note: A number of telephone calls were made to introduce the project to respondents and individuals on the register, but are not recorded here as interviews.

Interviews

Derick du Toit, AWARD project manager. May 2013

Kevin Rogers, Director of the Centre for Water in the Environment (CWE). June 2012

Natasha Potgieter, University of Venda. June 2013.

Appendices

Appendix 1: The Amsterdam Declaration on Global Change

Amsterdam, 13 July, 2001 – An important declaration on global environmental changes was made. Over 1,500 scientists from over 100 countries participated in the deliberations in drawing up the declaration. More details on this may be found at the link: <http://www.sciconf.igbp.kva.se/fr.html>

The scientific communities of four international global change research programmes – the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP), the World Climate Research Programme (WCRP) and the international biodiversity programme DIVERSITAS – recognise that, in addition to the threat of significant climate change, there is growing concern over the ever-increasing human modification of other aspects of the global environment and the consequent implications for human well-being.

Basic goods and services supplied by the planetary life support system, such as food, water, clean air and an environment conducive to human health, are being affected increasingly by global change.

Research carried out over the past decade under the auspices of the four programmes to address these concerns has shown that:

The Earth System behaves as a single, self-regulating system comprised of physical, chemical, biological and human components. The interactions and feedbacks between the component parts are complex and exhibit multi-scale temporal and spatial variability. The understanding of the natural dynamics of the Earth System has advanced greatly in recent years and provides a sound basis for evaluating the effects and consequences of human-driven change.

Human activities are significantly influencing Earth's environment in many ways in addition to greenhouse gas emissions and climate change. Anthropogenic changes to Earth's land surface, oceans, coasts and atmosphere and to biological diversity, the water cycle and biogeochemical cycles are clearly identifiable beyond natural variability. They are equal to some of the great forces of nature in their extent and impact. Many are accelerating. Global change is real and is happening now.

Global change cannot be understood in terms of a simple cause-effect paradigm. Human-driven changes cause multiple effects that cascade through the Earth System in complex ways. These effects interact with each other and with local- and regional-scale changes in multidimensional patterns that are difficult to understand and even more difficult to predict. Surprises abound.

Earth System dynamics are characterised by critical thresholds and abrupt changes. Human activities could inadvertently trigger such changes with severe consequences for Earth's environment and inhabitants. The Earth System has operated in different states over the last half million years, with abrupt transitions (a decade or less) sometimes occurring between them. Human activities have the

potential to switch the Earth System to alternative modes of operation that may prove irreversible and less hospitable to humans and other life. The probability of a human-driven abrupt change in Earth's environment has yet to be quantified but is not negligible.

In terms of some key environmental parameters, the Earth System has moved well outside the range of the natural variability exhibited over the last half million years at least. The nature of changes now occurring simultaneously in the Earth System, their magnitudes and rates of change are unprecedented. The Earth is currently operating in a no-analogue state.

On this basis the international global change programmes urge governments, public and private institutions and people of the world to agree that:

An ethical framework for global stewardship and strategies for Earth System management are urgently needed. The accelerating human transformation of the Earth's environment is not sustainable. Therefore, the business-as-usual way of dealing with the Earth System is not an option. It has to be replaced as soon as possible by deliberate strategies of good management that sustain the Earth's environment while meeting social and economic development objectives.

A new system of global environmental science is required. This is beginning to evolve from complementary approaches of the international global change research programmes and needs strengthening and further development. It will draw strongly on the existing and expanding disciplinary base of global change science; integrate across disciplines, environment and development issues and the natural and social sciences; collaborate across national boundaries on the basis of shared and secure infrastructure; intensify efforts to enable the full involvement of developing country scientists; and employ the complementary strengths of nations and regions to build an efficient international system of global environmental science.

The global change programmes are committed to working closely with other sectors of society and across all nations and cultures to meet the challenge of a changing Earth. New partnerships are forming among university, industrial and governmental research institutions. Dialogues are increasing between the scientific community and policymakers at a number of levels. Action is required to formalise, consolidate and strengthen the initiatives being developed. The common goal must be to develop the essential knowledge base needed to respond effectively and quickly to the great challenge of global change.

Berrien Moore III Arild Underdal Peter Lemke Michel Loreau Chair, IGBP Chair, IHDP Chair, WCRP Co-Chair, DIVERSITAS. Challenges of a Changing Earth: Global Change Open Science Conference, Amsterdam, The Netherlands, 13 July 2001

Appendix 2: Disciplinary travelogue of resilience and adaptive management

A way of looking at the world – such as resilience, adaptive management – could also emerge from a sub-discipline of ecology, and then travel across fields and disciplines with dazzling speed, for example in this (Folke 2006: 255) extract:

“Early applications of the findings were generated from the resource ecology group at University of British Columbia, particularly in relation to the insect spruce budworm and its role in boreal forest dynamics of North America (Holling, 1978; Ludwig et al., 1978), and from the Great Lakes groups (Regier and Kay, 2002), followed by examples from the dynamics and management of rangelands (Walker et al., 1981; Westoby et al., 1989), freshwater systems (Fiering, 1982) and fisheries (Walters, 1986).

Applied mathematics, modeling and applied resource ecology at the scale of ecosystems were combined with inductive science and experience from field work and large-scale management disturbances (Holling, 1996). The resilience perspective began to influence fields outside ecology like anthropology where Vayda and McCay (1975) challenged Rappaport’s (1967) concept of culture as an equilibrium-based system, in ecological economics in relation to biological diversity (Perrings et al., 1992), non-linear dynamics (Common and Perrings, 1992) and the modeling of complex systems of humans and nature (Costanza et al., 1993), in environmental psychology (Lamson, 1986), cultural theory (Thompson et al., 1990), human geography (Zimmerer, 1994), the management literature (King, 1995), property rights and common property research (Hanna et al., 1996) and also other social sciences (reviewed by Scoones, 1999; Abel and Stepp, 2003; Davidson-Hunt and Berkes, 2003). It became the theoretical foundation for the work with active adaptive ecosystem management where Holling, Walters and colleagues mobilized a series of studies of large-scale ecosystems subject to management—terrestrial, freshwater and marine. This process developed an integrative sense of the systems by using a sequence of workshop techniques for scientists and policy people to develop explanatory models and suggestive policies (Holling and Chambers, 1973; Holling, 1978; Clark et al., 1979; Walters, 1986).

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Appendix 3: Water Alternatives Manifesto

Water permeates all realms of life and many scientific disciplines. Water problems are often taken as technical issues, subject to rationalization, optimization and best addressed by expert knowledge. Yet, in the past three decades water issues have proved to be highly divisive and have generated heated debates. Engineer-centered approaches have been challenged or paralleled by concerns for the role of social organization, institutions, power structures and, more generally, politics; economists have assumed an increasingly prominent role in stressing the significance of demand management and economic efficiency; environmentalists have been active in introducing a more holistic view of ecosystems, underlining the importance of water for the environment and human health; social activists have vied for framing access to water as a human right.



As water increasingly appeared as a problem of societies sharing a scarce resource, the debate expanded into the modes of governance deemed appropriate to achieve desired outcomes. Although the concept of IWRM (Integrated Water Resources Management) holds the promise to reconcile goals of economic efficiency, social equity and environmental sustainability it is becoming clear that there is no consensus on how to weigh these priorities, or on how best to ensure their realization. Antagonistic views favoring either state control, market regulation, or management by communities or the civil society have been proposed. IWRM is read and appropriated by different constituencies to underpin different approaches to water resources management reform, ranging from rational-planning-based social engineering frameworks to politically grounded strategic action perspectives.

Scale has also emerged as a crucial factor. Water management solutions are clearly scale-dependent, from the user or community level to the system (distribution network) and river basin levels. Yet these scales come under interaction through the hydrologic cycle, often in an uncontrolled manner, prompting the need for corresponding nested levels of management and governance. Water policies are supposed to encapsulate state strategies for managing this complexity and have also increasingly become a subject of research.

Freshwater resources management is inherently a regional phenomenon, given how water flows over and under land. However, water resources management is increasingly embedded in wider ranging processes, including global ones. Examples are climatic change, economic globalization and global policy making. At the regional level, in developing countries relations between urban and rural areas are rapidly changing, deeply affecting water resources management. These changes imply a changing 'developmental role' for water resources, transforming its relationship with economic growth, livelihood security and poverty, and ecological sustainability, creating new patterns of 'winners' and 'losers,' along political, class, gender and ethnic lines.

The editorial team of [WaA](#) shares the view that water problems have often been framed in too narrow and too disciplinary ways, despite the apparent emphasis on integrated management. It also reckons that the political dimension of water resources development and management at all scales has been underplayed. As a result, perhaps, debates have often revolved around, and been stifled by, 'social engineering' concepts and models. Critiques of dominant modes of addressing water issues have been limited and too often been left to radical or ideological contenders. [WaA](#) is meant

to provide space for creative and free thinking on water, fostering debate, eliciting innovative alternatives, promoting original analyses and constructive critiques.”

Appendix 4: Individual surveys: Perspectives from within social sciences in the water sector

A total of 14 individuals responded to a survey. While a small sample (20% response rate), the surveys nevertheless give a qualitative insight into the views of some social researchers in water. In the material that follows below, the original wording from the respondents is preserved with only minor editing.

About the respondents

Respondents were from universities (6), 4 NGOs (4) 2 parastatals 2; (WRC and CSIR), consultants (2). All 14 participants wanted to attend the workshop.

Research interests

Of the 11 responses to this question, 6 respondents described their research interests in terms of outcomes: Environmental protection, affordable, well-managed water and sanitation services; meeting needs and aspirations of low income users; small scale rural water supply; water for productive use, multiple water use, local government support and development, appropriate technology; menstrual Health Management particularly for rural institutions provided with sanitation facilities; benefits of local water resources management at a catchment level, are these recognized; social Justice issues in water resource governance – water service supply inconsistencies, catchment management and pollution, Health and Hygiene and water conservation.

One respondent described her research interest in a way that linked outcomes and research: “Conducting research in a way that helps address water insecurity and water injustice at local (human) scale.”

Two respondents had meta-research interests: Social learning and interdisciplinary research; and robust and relevant physical/social science in food/energy/water/biodiversity nexus (process);

Two respondents described focus areas: Human dimension of water management; and Politics, governance, policy making, the role of theory in decision making, non-state entities.

The majority of respondents are thus interested in social questions in the first place, the second most popular formulation pointed to how social research is done (methodology and theory), and two had an interest in social research areas (actually the traditional way in which research areas are described).

View of water research: Strengths, gaps, weaknesses and priorities in SA water research

Seven respondents pointed to high quality research from technical perspective in current South African research:

1. The quality of research in the sector is of a high standard.
2. There is a very strong technical (disciplinary) engineering base to work from.
3. Research conducted on state entities like catchment management agencies and natural science phenomena and issues that impact on water quality like acid mine drainage and pollution from waste water treatment works.

4. Water sector research is at the moment touching several bases, e.g. technology, pricing, sanitation, resource governance and biodiversity
5. Research concerning the precarious situation of water supply security and the main factors impacting water security is quite extensive. Research on the energy-food-water nexus is producing knowledge on the interconnectedness of water, food, and energy systems. Research on socio-economic drivers of water needs and water usage provides understanding of demands and how these will change over time. Research on water resources, water management, water efficiency is well developed from a natural science/engineering point of view
6. The use of geographical information technologies (GIT) to analyse spatial themes and integrate social/population and physical/environmental information seamlessly. Also: better understanding of resource access, usage, quality and distribution
7. A lot of data is available on which to plan, good understanding of hydrological cycle, reasonable knowledge of water allocations (at least at macro level); qualified and experienced hydrologists and scientists.

Three respondents pointed to the special advantage of dedicated funding for water research via the WRC, and celebrated the enthusiasm and desire for relevant of water researchers:

1. The sector has a dedicated water funding agent, in the form of the WRC.
2. Abundant funding via WRC “very very few countries anywhere have this”. This enables investigation of a wide range of themes and topics.
3. The funding of water research by users is a particular strength.
4. The enthusiasm of water researchers
5. Water researchers generally have a deep wish to make their research relevant

Four comments specifically relevant to social research pointed to a mixed picture:

1. Exceptionally vibrant, dynamic & complex context of the social dynamics in SA
2. We have developed good social researchers and most especially in the field of collective bargaining and “making a plan”.
3. Inclusion of social issues in a highly technical sector.
4. A major strengthen is the development and limited application of the theories of adaptive management. There has also been some limited work done on the legal aspects of water management. However, whether this is by design or default, all these works have been conducted in a strong consultancy mode; thereby rendering the outputs shallow and superficial

Gaps and weaknesses in the water sector

General criticisms

1. A lack of focus on capacity building/development in water research projects – as indicated by statements like “we trained a few people in a workshop”.
2. Poor connectivity between disciplines, and even within them (between sub-disciplines). It leads to redundancy of effort due to incomplete / inappropriate developments being made, and/or repeated work.
3. The WRC itself has far too much discretion in setting the agenda of water research, and needs to be more open to the inputs of the researchers themselves; of course a balance is needed between idiosyncratic / emergent / urgent / important, etc. issues , but in some sub-sectors it is evident that particular research managers pursue particular themes and tend to veto topics that fall outside their particular areas of interest or expertise. This is particularly evident in the choice of some topics for solicited bids, sometimes with no other funding provided for unsolicited proposals at all for that sub-sector.
4. Very poor process of peer review. The whole WRC process rests on the voluntary steering committee system. When it works, it can work well. But many people get drafted on to committees and give attendance low priority. Meetings are irregular and frequently postponed, so a whole year can go by while researchers might be pursuing poorly formulated questions or writing up dodgy research. Some WRC research reports are extremely weak. The whole process of how WRC projects are quality-controlled needs to be reviewed.
5. There is a limited pool of researchers, and some of the researchers lack research rigour.

Problems with social research

1. There is a lack of experienced social scientists active in the water research sector, and poor relationships with, for example, the HSRC. Many of the research groups working on issues of poverty, for example, are not well linked in to the water research sector.
2. Social research has fallen by the wayside in terms of priority reflecting implementing organisations’ bias towards meeting targets to the detriment of also sufficiently factoring in the usability, appropriateness and sustainability of water service delivery options and policy.
3. There no theoretical depth in research. Almost all research relies to some extent on positivist thinking and theorizing. Theories like adaptive management, on which the water research community is pinning a lot of hope on to help solve our water problems, are but one side of the theoretical coin. Other post-positivist theories, like social constructivism with its focus on norms and non-state actors are almost ignored. In this regard, the Water Research Commission could spotlight these theories and researchers using these theories more, and move away from those that promote predominant positivist theories. It needs to strike a balance.

4. Most social research in the water sector is still conducted by natural scientists. This weakness relates to the theoretical one in that natural scientists do not have the social theoretical grounding to conduct proper social scientific research
5. Inability of the sector to successfully integrate technical and social teams in planning, implementation and M&E of sector projects. Social research findings hardly being tabled for the technical teams in concerned departments', e.g. findings often end up with institutions/Units that commissioned them who are social.
6. There is need for more work on the behavioral aspects of water management; ethics/values; comprehensive water governance studies
7. Research on how to improve the science-society, science-policy interface is not sufficient, leading to a situation where water management often is not sufficiently evidence-based and adaptive. Methods for the co-design and co-creation of knowledge need to be developed, and considerable social research is needed to bring the societal stakeholders into this processes, particularly those traditionally disadvantaged. Understanding cultural aspects of water usage and cultural obstacles for improved efficiency in water usage is not sufficiently addressed
8. Too little attention to tertiary-level/local catchment management initiatives, community participation, research support and integrated analyses regarding local/particular landscape/ecological functioning

Lack of practical application of research

1. *Gaps are in the area of escalating research findings to practical projects that seek to remedy the ills and inconsistencies on the ground. Decision making seem to ignore recommendations made in research. The gulf is in linking, political decision making to academic research and financial investments to expedite service delivery and the enhancement of natural resources.*
2. The translation of technical detail, projects, reports into socially useable products.
3. A lot of excellent technical reports, but a lot of it simply speaks to the usual networks and preaches to the converted.
4. Making research relevant and useful to those with limited access to power and information, i.e. the people at the receiving end of other people's decisions on water management.
5. It is not helpful to refer to "the water sector", which creates unhelpful barriers, rather refer to "multi-stakeholder social learning in order to wisely share our common water resources" (because allocation is a social not a technical process)
6. All Sector leaders need to understand the concept of socially robust knowledge (aka actionable knowledge) and how to co-generate it.

Research priorities

Respondents produced a wide ranging agenda of research priorities (they were not asked to produce a social research agenda)

Communities benefiting

1. Water and rural development
2. The development of small-scale MUS systems for rural communities
3. How to reallocate water effectively;
4. Research on the conflict of interest (CoI) arising from competing water needs for agriculture and urban development to guide stakeholder deliberations required to negotiate this CoI and to mediate a societal consensus to the benefit of all. Social research (besides science and technology knowledge) is crucial for a better understanding of the CoI.
5. Understanding the socio-economic value of water;

Capacity building

1. Strengthening local government capacity for water and sanitation service delivery, creating and supporting local capacity for IWRM and informing the ongoing water resources management reform process.
2. Strengthening local capacities in managing water resources: demystifying (IWRM) and showing how it could be done in a simple practical ways

Resource and ecosystem protection

1. To understand the vulnerability of water systems to climate change and to research options for adaptation to reduce the risk of increased water scarcity; climate change and water (2);
2. Management of human impact on water quality and river functioning; water quality issues; protection of the water resource in terms of its quality and quantity; ecosystem protection (4);

Meta-research issues

1. The uptake of research in decision making – in general and not government decision making. Private companies also make decisions and policies that affect society and the natural environment.
2. Strengthening ability of affected communities to gather and analyse data that can assist them in challenging poor water practices (e.g. contaminated streams, poor services delivery, etc.) and can help them improve their water security.
3. Participatory research processes are important
4. Emphasis on hard scientific (chemical) and technological aspects

Need for social research

1. Human/Social dimensions of water research and management are critical.
2. Development of stronger theoretical and methodological premises; behavioral studies; political economy studies.
3. Social researchers can research how best to create conditions in which social learning can take place in a robust crucible which does not allow stakeholders to run away when the implications of integration become apparent. All our Policies and even Chapter 3 of the Constitution have co-operation and integration as key constructs BUT in the realm of water the technocrats have dominated the conversation for so long that we as a society are pathetic at co-operation and integration. Our inability to implement our world class Policies & Legislation which champions these concepts is my evidence for the above statement.
4. Getting to grips with what's really going on, institutionally [as in 'rules of the game / norms / belief systems] in DWA and municipalities around water services. Sort of like what Karl van Hold wrote around the public Health sector. Various iterations – “The South African post-apartheid bureaucracy: inner workings, contradictory rationales and the developmental state 241 ” “Nationalism, bureaucracy and the developmental state: the South African case”. The water sector needs something similar, as there's a limit to what we can fix pursuing Blue Drop / Green Drop accreditation, however valuable that may be. We can't continue producing normative rational-technicist finger-pointing prescriptions around what is needed; we need to put more effort into understanding the perceptions and responses of a) national / provincial municipal officials and decision-makers and b) water users across the spectrum. There's frequently a complete non-alignment of paradigms, which means a lot of time and money is being wasted pursuing themes and “answers” that have little relevance to the real problems bedeviling especially the municipal water services sector, and few points of traction. Here is one small example from a series of focus group discussions with low income households around their experience of water services: *The findings suggest that many informants have a world view that runs counter to the assumptions informing municipal tariff setting and water demand management. The preference for flat rates – with an unvarying monthly fee, irrespective of consumption – is fundamentally at odds with current approaches to demand management with their emphasis on individual household accountability for individual household consumption. Building awareness of the reasons for introducing volumetric tariffs will require considerably more thought and more effective communication than has previously been assumed*, i.e. Very little traction on the ground with the key messages of DWA's billboard campaigns. DWA seems oblivious, and we don't have a better suggestion around how to communicate
 - a) growing water scarcity
 - b) the need for greater collective responsibility around how we use potable water
 - c) what water services actually cost

Current and past social science research

This section deals with whether the organisation or individual is currently engaged in social science research, has done so previously, or is planning to do so. Some information from this section has been used in the landscape description (previous section, under Monash University, UKZN, EMG and Mvula Trust).

Service delivery

1. Municipal perceptions of using groundwater
2. Water services delivery impacts,
3. Local accountability in services delivery,
4. Water quality
5. Service delivery,
6. Institutional arrangements to govern water catchments
7. Water security,
8. Water services
9. Water rights
10. Water for productive use.

Water resources

1. Action research on climate change adaptation
2. Legal and institutional issues pertaining to natural resource management;
3. Ecological functioning (runoff, storage, carbon storage),
4. Local conservation and environmental management initiatives.
5. Local participation in management of water resources.
6. Benefit sharing mechanisms in natural resource management
7. Human dimensions of water and water management
8. Water governance.
9. Property rights issues

Other

1. Research to develop systems of social learning that will yield socially robust water relevant knowledge within the paradigms of post-normal science.

2. Citizen science and participatory agent-based social simulation modelling
3. Mainly outside South Africa, e.g. Political economy of urban water tariffs in Indonesia.
4. Application of GIT in analysis of catchment change (human/economic/agricultural activity),
5. population trends.

Previous research includes (this section is divided into topics and titles, and is given here to indicate the range of work undertaken)

Topics

1. The NFEPA project, particularly the capacity building and implementation side, which was taking the technical aspects and information and transforming those through participatory processes with end users into guideline implementation documents.
2. Pro-poor water regulation;
3. Establishment of CMAs;
4. Research around WUAs;
5. Water footprinting;
6. Water pricing and financing.
7. Informally documented work to assist with lobbying and advocacy in relation to access to water,
8. Water bills and water tariffs,
9. Use of different forms of water for food-growing,
10. Participation in forums/processes such as CMAs, IDPs, etc.,
11. Community observation of hydrological changes.
12. Integrating health and hygiene education in the water and sanitation sector in the context of HIV and AIDS.
13. The institutional dimensions of water and sanitation services management and provision – revenue management / performance management / subsidy arrangements / user perceptions around service levels and infrastructure options / public accountability and governance
14. Implementation challenges around equitable and sustainable Free Basic Water
15. Reported data on a range of performance indicators relevant to FBW, versus actual reality
16. Focus group discussions around user perceptions of FBW and related service issues in three secondary cities.

Titles

1. Performance of Community-Based Natural Resource Governance for the Kafue Flats
2. A Theoretical Framework for Understanding Benefit Sharing Arrangements with Particular Reference to the Water Sector.
3. Social Capital, Community-Based Governance and Resilience in an African Artisanal River Fishery.
4. Civil Society Dialogue in Water Resources Management: Lessons from Four Local-Level Experiences of River Systems.
5. When taps turn sour: A report on the 2012 acid mine drainage crisis in the municipal water supply of Carolina, South Africa
6. The River as an artefact: Interpreting the Groot Marico and its people in the 21st Century

7. Bridging the policy divide: Women in rural villages and the Water For Growth and Development Framework.
8. The potential of Civil Society Organisations in monitoring and improving water quality.
9. Encouraging citizens' water quality management through sub catchment forums
10. Views on unlawful water abstractions along the Liebenbergsvlei River, South Africa.
11. SIBU and the crisis of water service delivery in Sannieshof, North West Province
12. An investigation into the environmental health of the Vaal River in the vicinity of Parys
13. Water demand management's shadow side: tackling inequality and scarcity of water provision in Cape Town
14. Governance and Politics in the upper Limpopo River Basin, South Africa.
15. The Politics of Establishing Catchment Management Agencies in South Africa: The Case of the Breede-Overberg Catchment Management Agency.
16. A Governance and Politics Assessment Framework.
17. GIMMS: A GIS-tool for integrated mapping and management of groundwater drought vulnerability and insecurity in the SADC region.
18. Who wants to be an agent? A Framework to Analyse Water Politics and Governance.
19. Hydro-hegemony or water security community? Cohesion, cooperation and conflict in transboundary river regimes in the SADC region.
20. A Sediment Study in the Upper Olifants River Basin, Mpumalanga, South Africa and its Policy Application.
21. Theorising Complex Water Governance in Africa: The Kunene River in Southern Africa as a Complex Adaptive System.
22. Norms, Beliefs and Attitudes around Water Use Efficiency in Selected Portions of the South African Agricultural Sector.
23. El Niño Southern Oscillation, South Africa's Looming Water Crisis and Baloney: Complexity and Transdisciplinarity as Necessary Tools for Robust Policy Thinking.

Working in interdisciplinary teams

13 of the 14 respondents reported working in interdisciplinary teams or collaboratively. One often worked alone, and another stated that his best work came from working on his own.

Commenting on interdisciplinary or multidisciplinary work, respondents list the following benefits:

1. Rich social learning
2. New knowledge creation beyond disciplines
3. Ability to grapple with complexities via a wider set of questions and tools
4. Provides deeper and profound insights into research problems and possible solutions
5. Transdisciplinary work suites issue-based and solutions oriented approaches
6. Combine people with training in science and policy analysis

Challenges were also identified:

1. It may take longer
2. Difficulties in managing other people's work
3. Like-mindedness is needed
4. It depends on whether social issues (including institutional issues) are seen as being less important than so-called technical issues
5. Social scientists are seen as service providers that come in after the research had been conducted and natural scientists then wants us to go out and 'change people's behavior' based on the research they did.

And this remark was volunteered: “One of the key areas is the sociology of science. Science is thought of as a conversation in my inter-disciplinary virtual research group. “

Analysis of the survey results

The survey confirmed the need for more support to social and interdisciplinary research. It confirmed that many social scientists enjoy and benefit from interdisciplinary research. It also expressed confidence in the importance of social theory and social methodologies in the formulation of research questions. It is clear from the survey that there is some frustration with the role the social sciences play in the sector currently.

The respondents overwhelmingly pointed out the importance of the WRC and specialized funding for water research. They are generally impressed with the quality of the natural science and engineering based research in the WRC.

A striking feature was the emphasis on practical usefulness of research, allied with a parallel emphasis on empowering communities to understand and monitor service delivery and water resources.

However, there was much criticism of how much the research is used in practical ways.

Finally, the examples of work by the respondents in this small sample indicated that there is already a sizeable production of social research.

Conclusions and way forward

The project’s intention of creating more space for social research, in the form of interdisciplinary research, is supported by this scan. There is support for a number of basic assumptions

More social research is needed to deal with social problems, or social aspects of complex problems. One of the prominent questions is WHY the excellent knowledge in our water sector has not led to more success in dealing with challenges in the water sector. There is an expectation that more – and better – social research can help in this regard.

There are already advanced discussions and practice of interdisciplinarity (maybe more so than the need for social science work), but these are uneven. Social scientists express discomfort with the way some of this work has proceeded, and in particular a disregard for the specificities of social science, and the skills needed in the form of strong theory and robust methodology. While it is important to work in an interdisciplinary framework, there should also be space, especially at this early stage of this process, to pay attention to the specific disciplines and the contributions they can make.

The tasks ahead in making more space for a contribution from the social science, are of the type that are best driven by a community of practice. That is in itself an art and a commitment.

The process of creating a register of social and allied scientists in water should continue beyond this deliverable and possibly beyond this project.

Appendix 5: Workshop 1-2 August 2013

Day 1: Sensing & Presencing

Introduction

There is a growing recognition among South African water researchers of the need to deal with social problems in the water sector through robust social science theories and methodologies, to bring these skills into multidisciplinary water research teams and to define a strategic social research agenda. The WRC Corporate Plan 2013 - 2017 has as one of its main objectives a move towards a bigger role for social science.

This workshop was the final step in a short WRC consultancy project to encourage the participation of social science researchers in the work of the WRC and the water sector.

The workshop aim was to move towards developing a social science research agenda for the water sector, while providing an opportunity for participants to explore issues around social research in the water sector that are important to them.

A process facilitation team was contracted to run the workshop to encourage interaction and participation, in the spirit of an emerging community of practice of social and interdisciplinary researchers.

Session 1: Welcome, Introduction & purpose of workshop

Process: This session consisted of presentations to set the scene for the workshop (powerpoint presentations are available on request).

Workshop programme:

Session 1: Welcome, introduction, purpose of workshop

- Welcome and introduction (**Dr Inga Jacobs, WRC**)
- The need for more social and interdisciplinary research in the work of the WRC, a strategic perspective (**Dhezigen Naidoo, WRC**)
- Overview of project and workshop (**project leader Dr Victor Munnik**)
- Introduction to workshop programme and process (**Reos Partners, Karen Goldberg and Busi Dlamini**).

The first session of the workshop introduced participants to the purpose of the workshop and how it fits into the overall vision of the WRC.

Welcome and purpose of workshop – Dr Inga Jacobs (WRC)

Dr Inga Jacobs introduced the WRC's internal strategic process, which includes working towards a broader focus on social science research.

Currently there are 282 projects funded by the WRC. Thirty five of these are led by social scientists. Eighty-five projects include social science methodologies and interdisciplinary approaches.

Numerous natural science projects have social implications.

The underlying question for the WRC is: What value would there be to add social science elements into what is being done in science projects? What can social methodologies contribute to water research?

She introduced the purpose of the workshop as two fold:

- a) a step in the WRC’s own strategic process
- b) to support social scientists to realise this strategic purpose:



Diagram 1: Purpose of the workshop

The need for more social and interdisciplinary research in the work of the WRC, a strategic perspective - Dhesigen Naidoo, WRC

WRC CEO, Mr. Dhesigen Naidoo drew attention to South Africa’s global performance in water research as represented in the diagrams below. He noted that South Africa is a major player in the global water research landscape but that our research strengths lie mostly in the domains of engineering, physical science and natural science. He argued that this is reflected in the linear approach that dominates South Africa’s responses to complex water problems and called for embracing a complexity approach to dealing with water issues.

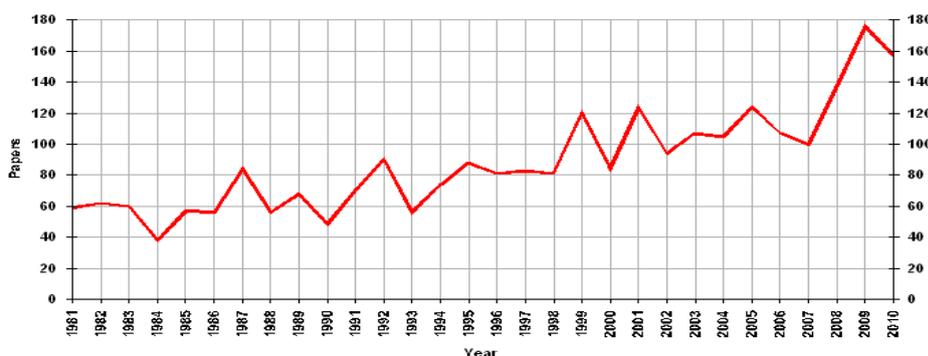


Diagram 2: South Africa’s ISI publications in Water Research , 1981-2010

Rank	Country	ISI Papers
1	USA	20 811
2	PR China	5 504
3	Germany	4 869
4	Canada	4 664
5	England	4 490
15	Switzerland	1 601
16	Taiwan	1 523
17	Sweden	1 308
18	South Africa	1 277

Diagram 3: Top 20 international performers in Water research

He introduced the WRC concept of 'lighthouses'. These were listed as follows:

- Climate Change
- Green Villages
- Water-Energy-Food nexus
- Water Governance
- Water sensitive design.

He gave the example of the 'water sensitive design' lighthouse:

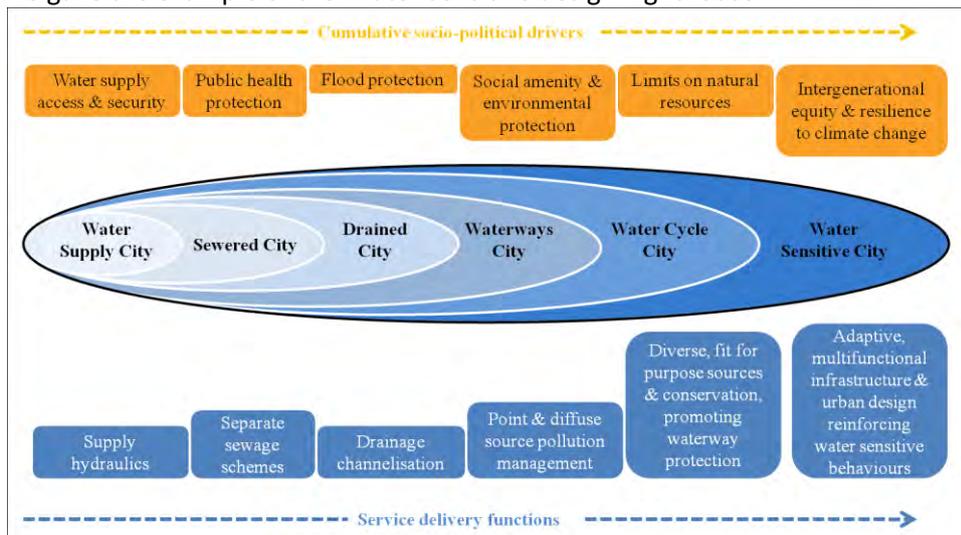


Diagram 4: Water Sensitive design lighthouse

Overview of project and workshop - Dr Victor Munnik

Dr Victor Munnik introduced and explained the purpose and work that had been done by the consultancy project "Towards a social and interdisciplinary research agenda for the water sector in South Africa", in preparation for this workshop.

He spoke to the 'enabling' purpose of the workshop to develop a community of practice and what this could mean for the water sector and research in the water sector. What could such a community of practice achieve?

- An effective and self-renewing water research sector,
- Held together by an ethos and practice of interdisciplinary work,

- Solidarity between institutions, universities, government departments, communities, and NGOs,
- An intellectual asset for building a participatory democracy,
- A growth node for a knowledge economy and
- Contributing to democratic thinking in the region.

He raised key questions for the workshop and for a social science community of practice, these being:

- Can there be a “social research agenda” or must it of necessity be part of an interdisciplinary agenda? If so, do the social sciences play a leading role in problem formulation and research synthesis?
- What are the conditions under which the best, most useful and emancipatory, transformative social science can flourish and be effective?
- What type of social science will fill this space? Can we influence this and how?
- What is good social science? Does it depend on strong social theory and robust and appropriate methodology? What do these terms mean?
- What are the roles of the disciplines? Do we really need jargon? How do we work together across disciplinary boundaries?

Facilitation Process

The facilitators drew on the ‘U process’ to guide the workshop. This process is based on some principles of complexity theory:

- You can’t use linear thinking to solve complex problems
- In order to bring about change in the world we need to change the way we think and see things
- Core to the process of change is changing our ways of relating with each other and the issues at hand.

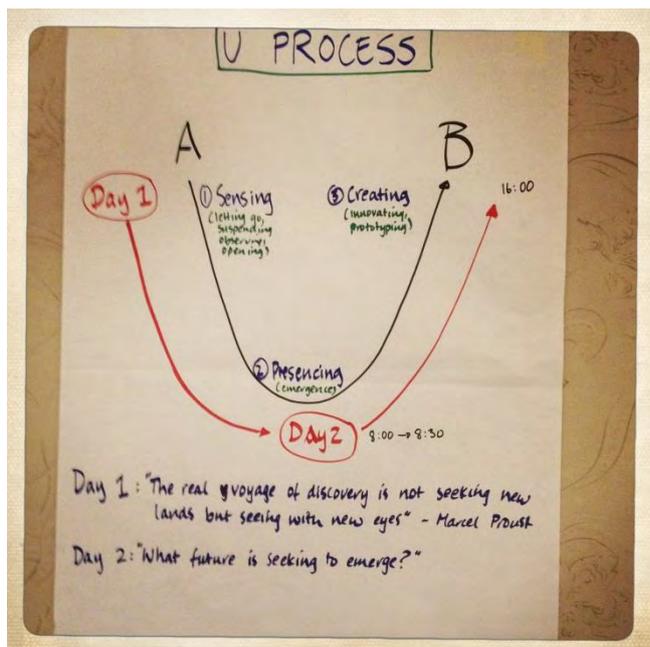


Diagram 5: The “U-process”

The facilitators work with three types of complexity:

- a) *dynamic complexity* which calls for issues to be worked with and viewed as systemic,
- b) *social complexity* which calls for a participative approach,
- c) *generative complexity* which acknowledges that the future is unfamiliar, undetermined and the process of dealing with complex issues is creative and emergent.

The workshop was strategically designed using the U- process (See below). Day one focused on making sense of what is (In the diagram this is A: Sensing). By the end of day one the group would be moving into stage two, (B: Presencing) starting to recognize what is emerging. Day two focused on moving towards the next step, potential solutions and or innovations (C: Creating). Open Space Technology was used to facilitate this process. (For more information on Open Space Technology go to:

[http://www.openspaceworld.org/cgi/wiki.cgi?AboutOpenSpace;](http://www.openspaceworld.org/cgi/wiki.cgi?AboutOpenSpace)

https://en.wikipedia.org/wiki/Open-space_technology and

http://www.openspaceworld.com/brief_history.htm)

Session 2: The Landscape of Social research in Water

Process: This session was run as presentations to introduce the current landscape of social science research in South Africa. This included sharing results from the consultancy research project, and experiences/insights from the different institutional settings within which social science research is conducted (powerpoint presentations are available on request).

Session 2: The landscape for social research in water: Developing a deeper understanding of the social research context (plenary and parallel sessions)

- Results of the scan and survey of capacity for social research (**Victor Munnik**)
- The transdisciplinary support that the NRF is pursuing, with specific reference to the area of water. (**Dr Kaluke Mawila, NRF**)
- How easy or difficult is it to build a centre of excellence around social research in the water sector? (**Prof Heila Lotz-Sisitka, RU**)
- Social research in the consultancy world: (**Barbara Schreiner, Pegasys**)
- How and why is social research done by NGOs? (**Jessica Wilson, EMG**)

Results of the scan and survey of capacity for social research - Dr Victor Munnik

Dr Victor Munnik observed that as a “research object” the capacity for social research in water in South Africa was not clearly visible. He introduced the scope of the survey, observations and conclusions that could feed into workshop discussions. These were:

- South African universities either already have water institutes, or are creating them.
- Expressed transdisciplinary commitment.
- Natural science and engineering still seem to dominate these institutes.

- The institutes emphasise the need to, and their intentions to, work with concrete problems, working with stakeholders and communities.
- The applied social sciences – law and economics foremost among them – are important.
- Basic social sciences like sociology, history, philosophy, anthropology and geography contain individuals with an intense and growing interest in water. Often closely aligned to a general interest in “sustainability”.
- Many of these individuals, especially students, are not currently visible.
- It is noticeable that parastatals, consultancies and NGOs also contribute to social research.
- There is a sizeable body of social water research, but it is scattered
- WRC is seen as an exceptional attribute to the water sector (it provides 60% of water sector research funding). Not all countries have such an institution.
- Humanities Charter needs to be engaged with, as it presupposes big changes in institutions, funding flows and themes for social research.
- Further research: as social researchers are drawn in, the capacity for social research will not only grow, but the picture will become clearer.

The transdisciplinary support that the NRF is pursuing, with specific reference to the area of water - Dr Kaluke Mawila, NRF

Dr Kaluke Mawila noted that water is a priority for the NRF and that trans-disciplinary research is to be encouraged in addressing South African water challenges.

She highlighted that from 2007 -2013 there were 606 projects funded by the NRF that had a water focus. This equates to an investment of R63 million in the water sector. Out of all these projects only 4 were trans-disciplinary. The NRF funds social science in many areas to the value of R128 million. This points to a gap in social science research in the water sector.

The NRF has a mandate to fund trans-disciplinary research but they get very few proposals from the water sector. Under the ‘Global Challenge’ fund out of 14 water related projects only one was run by a social scientist.

Dr Kuluke Mawila highlighted the following opportunities in the NRF for social science research in the water sector:

1. Global Challenge Research Programme
2. Belmont Forum
3. Indigenous knowledge systems programme
4. Blue Skies research programme

Dr Kuluke Mawila ended with the following questions for participants of the workshop to consider:

- Is there political will to support the funding of the SS research agenda and its mainstreaming?
- Do we have suitably configured funding instruments within the National System of Innovation to strategically and sufficiently accommodate SS research modalities?
- To what extent does science communication assist in mobilising SS scholars to proactively mobilize/organize to map and strategically position their science as ‘mainstream’ rather than peripheral grant beneficiaries

How easy or difficult is it to build a centre of excellence around social research in the water sector? - Prof Heila Lotz-Sisitka, Rhodes University

Prof Heila Lotz-Sisitka described how the Environmental Learning Research Centre (ELRC) manages research, mostly student post graduate research, around the concept of 'scholarly communities of practice' (See diagram below) with a socio-ecological research focus.

Organised into scholarly communities of practice

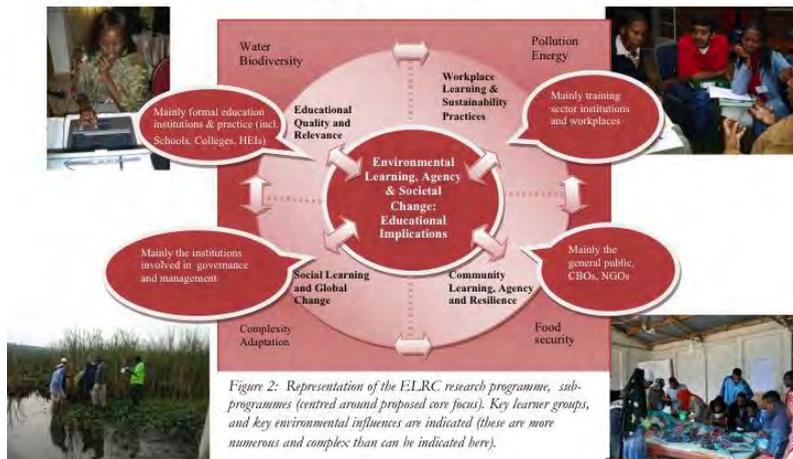


Diagram 6: Representation of the ELRC research programme

She highlighted what she called key 'easy/difficult' elements being:

- Methodology
- Research Object (social / social-ecological?)
- Scholarly Communities
- Partnerships
- Research Outcomes
- Economy

The most difficult of these is the problem of methodologies. She asked the question "why are we so methodologically obsessed?" She answered by saying that positivism is inadequate for answering complex social problems. She then gave a historical trajectory of social theory as it had been experienced and engaged with through Environmental Education at Rhodes University as follows:

- Navigating the paradigm wars. The delineation of the paradigms at this stage are represented in the slide below.



FIRST BIG CHALLENGE: Navigating the early 'paradigm wars' and they were all about

	POSITIVIST RESEARCH	INTERPRETIVIST RESEARCH	CRITICAL RESEARCH	
ONTOLOGY	Realist	Constructed	Constructed	Post-structural critique, followed by critical realist critiques
EPISTEMOLOGY	Objective	Subjective	Constructed	
AXIOLOGY	Assumed to be neutral	Plural, contingent	Standpoints - values explicit	
METHODOLOGY	Experimental	Ethnographic / phenomenographic	Action research	
METHODS	Quantitative / measurement	Interviewing, observations	Participatory, action centred	

Politics of knowledge / developing understanding of the social object of research / democratisation

Diagram 7: Paradigm wars

- The emergence of the 'socio-ecological research object set the challenge of moving beyond the paradigm wars into socio-ecological research experimentation.
- This led to a look at the philosophy of methodology in terms of a relationship to the world, knowledge as process and knowledge in practice.

At the ELRC these debates have led to a way of working with theory that a variety of theorists call 'thinking with theory' (which means not be colonized by it) while working with the object of research being the socio-ecological object as studied by the socio-ecological sciences.

This has led to a major re-drawing of methodological possibilities.

CURRENTLY: A major re-drawing of methodological possibilities

	POSITIVIST RESEARCH	INTERPRETIVIST RESEARCH	CRITICAL RESEARCH	POST-STRUCTURAL RESEARCH	NEW MATERIALISM / CRITICAL REALISM
ONTOLOGY	Realist	Constructed	Constructed	Constructed	Realist
EPISTEMOLOGY	Objective	Subjective	Constructed	Constructed	Constructed & Shaped
AXIOLOGY	Assumed to be neutral	Plural, contingent	Standpoints - values explicit	Standpoints / Positioning	Emergent / Relational
METHODOLOGY	Experimental	Ethnographic / phenomenographic	Action research	Deconstruction	Relational mapping / analysis
METHODS	Quantitative / measurement	Interviewing, observations	Participatory, action centred	CDA	Observations, tracings, mapping Mixed methods

Inter-disciplinary & Trans-disciplinary Studies
Focus on a social-ecological research object

Diagram 8: Methodological possibilities

Dr Heila Lotz-Sisitka then spoke to what needs to go with this methodological story? She identified the following roles/challenges that a centre such as the ELRC works with.

- Actively encouraging and Enabling scholarly communities (PhD weeks, Research groups, Research programmes, Reading groups, Seminars etc, Conferences, Creative activities)
- Building a home for research that can live in the world through partnerships.
- Making the outcomes of research useful in the world (Conduct Community Engaged Research, Journal articles, Books, Popular articles
Books that shape practice, Course Materials, Community Engaged Activity)

She identified the main challenges facing the ELRC as being creeping managerialism, knowledge privatization and uneven funding structures.

Social research in the consultancy world - Barbara Schreiner, Pegasus Consulting

Barbara Schreiner identified the following elements that made up the landscape of doing social research in the consultancy world as:

- Scope determined by client
Consultant determines (to some extent) the methodology
- Usually focused on a particular project or solution
Normative – based on a particular policy preference – good ways of achieving recognised aims/ends/goals
- Sometimes a smaller part of a technical project e.g. infrastructure projects;
- Interesting challenge in communicating with ‘techies’
- Limited timeframes
- Sometimes limited by client needs and understanding
- Not published
- Not peer reviewed
- Direct link to implementation

How and why is social research done by NGOs? - Jessica Wilson, Environmental Monitoring Group

Jessica Wilson highlighted the elements of the NGO landscape that influence social research. These were:

- NGO's are value based. Many do not believe that economic growth is going to solve problems
- The motivation is to make a difference in the world
- Tend to be dynamic. What this means for water is that water is not seen as an isolated issue but as part of a bigger picture: what does it mean to bring about environmental justice?
- NGO's are usually able to pollinate between different scales and issues.
- Are accountable to people they work for which often means a longer term commitment to an area and people.
- Challenge of funding.
- Usually consists of networks that rely on volunteering.

The main reason why NGO's engage with research is to meet their own needs for evidence and analysis to inform and strengthen campaigns, tackle problems directly, and to deepen our understanding of the issues we're working with. Research is usually conducted as action research

which has at its core an emancipatory aim and challenge what research means and the power of objective science over direct experience. The focus of research is always on a social problem and generally consists of local, detailed case studies.

Session 3: Social research and disciplines

Process: This session was run like an African market place. Presenters were given the opportunity to briefly advertise their topic for discussion after which participants chose which discussion to go to. Presenters introduced the topic in approximately 10 minutes and then opened up the topic for discussion. The main points raised in the discussion were presented back at the end of the day in plenary.

Session 3: Social research and disciplines: Examples of the contributions of social research (parallel sessions)

- Dynamics of Community Non-compliance (**Dr Lynette Dreyer**)
- Ethics, social justice and human well being: the Capability Approach and Integrated Water Resources Management (**Prof Jacqui Goldin, UWC**)
- "No to extraction!" Action research around water and sanitation issues (**Dr Mary Galvin, Umphilo waManzi**)
- The politics of studying service delivery protests (**Dr Barbara Tapela, PLAAS, UCT**)
- Anthropology of waste water, especially in informal settlements (**Prof Mugsy Spiegel, UCT**)

Documented below is a brief description of each topic including a reference to a paper by the presenter.

The Dynamics of the Water sector – early experiences – Dr Lynette Dreyer, Sociologist

Lynette's discussion focused on her early experiences of working with the WRC and a project that she was involved in called "The Dynamics of Community Non- Compliance with Basic Water Supply Projects", which she believed was the first social science project funded by the WRC. It investigated 24 projects of the Mvula Trust in the then Northern Province, Eastern Cape and KwaZulu- Natal.

The key issue underlying the work at the time was the disciplinary differences between engineering and social science. This she puts down to the kind of language used by social scientists and suggests that problems must be analysed without disciplinary jargon or conventions.

Ethics, social justice and human well-being: the Capability Approach and Integrated Water Resources Management - Prof Jacqui Goldin, UWC

Prof Goldin introduced the capability approach of Amartya Sen, and how it is used as a framing for social research at the University of the Western Cape.



Small group discussion

"No to extraction!" Action research around water and sanitation issues - Dr Mary Galvin, Umphilo waManzi

The main argument of Mary's topic was that "We need to challenge our old ideas of *"who does research?"* and *"how we do research?"* to confront questions of integrity."

Responding to her question *who does research*, she argued that not enough researchers ground their work in local realities and complexities. She argued that NGO's are usually the best suited to do this as they are accountable to the people with whom they work but operate within the context of macro issues. They are committed to supporting the community as far as possible. Although this is so, it can be manipulated by claiming (without adequate grounds) that findings from local people prove the researcher's normative agenda. There is a gap between findings and the researcher's own analysis that must be made explicit.

Responding to her question *how we do research*, she introduced a continuum that includes: **classic qualitative - ethnographic techniques – ethnographic – participatory - participatory action research (PAR)**. These vary according to whether they focus on the research "subject" or they involve or empower community members and how they feedback/give back to the community.

She highlighted two points that need to be considered with regards participatory methods: an avoidance of positivism, and a careful consideration of accuracy of perception both in terms of the community and 'community outsiders'. This can be avoided through triangulation and dialectical engagement. She concluded that action research is ultimately about transformation through the research process rather than as an outcome of research findings being taken up.



Dr. Mary Galvin on participatory action research

The politics of studying service delivery protests - Dr Barbara Tapela, PLAAS, UCT

Dr Tapela discussed the many challenges facing the researcher of service delivery protests. In these protests, water issues are only one source of discontent, and only one dynamic driving these.



Dr. Barbara Tapela on the issue of service delivery protests

Anthropology of waste water, especially in informal settlements - Prof Mugsy Spiegel, UCT

Professor Mugsy's talk centered on the following question: "In whose interests do we approach and address issues of waste water?" He also asked the question, "are there shorter and longer term interests?" He discussed the level of issues in terms of institutional blockages to dealing with the engineering aspects of waste water. He spoke to the work he is involved in which looks at comparative studies to try and understand what makes waste water technology work in one area and not another. As an Anthropologist this means engaging in an ethnography of the landscape to understand local context and the broader context of waste water management actions. The importance of this approach is understanding that knowledge is embedded in social contexts and if

we are going to understand and be able to act effectively we need to develop a deepening understanding of context.

Session 4: Dealing with urgent social questions

Process: The process was the same as Session 3.

Session 4: Dealing with urgent social questions (parallel sessions)

- History, transdisciplinarity and emerging social water issues (**Prof Johann Tempelhoff, NWU**)
- When social scientists are invited late in the process; The importance of including social scientists in research problem formulation (**Dr Karen Nortje, CSIR**)
- Tackling social aspects of IWRM, complexity, social learning (**Jane Burt, for AWARD**)
- A transdisciplinary project with the explicit adoption of a transdisciplinary framework. (**Dr Tally Palmer, RU**)
- Nurturing a community of practice around IWRM research, a history (**Eiman Karar, WRC**)

History, transdisciplinarity and emerging social water issues - Prof Johann Tempelhoff, NWU

Participants in the two sessions listened to the Los Angeles Guitar Quartet performing a piece entitled “The Lotus Eaters”. They were made aware of melody (tone), harmony and rhythm. These three elements are also present in all other forms of human activities. We get to understand a melody and find it interesting, along with the rhythm. There is a universal understanding of what music implies. Professor Johann Tempelhoff argues that the same should happen when we conduct Trans-disciplinary research. We need to locate the melody, harmony and rhythm. Also water has a universal language in its communication with us. We are simply not always aware of the levels of communication open to us. Professor Tempelhoff used this metaphor to open up group discussion on the following topics:

1. Universal language of music and water
2. The human condition – based on the work of Hannah Arndt
3. Solastalgia of Glen Albrecht
4. Transdisciplinarity – A Montuori
5. Concept of memory – move away from historical consciousness to an awareness of the past and the intrinsic role of memory.

When social scientists are invited late in the process; The importance of including social scientists in research problem formulation - Karen Nortje, CSIR

The focus of Karen’s talk was two –fold:

- What happens when social scientists are invited “late” into the process? AND,
- How do ‘research problems’ change once a social scientist gets involved?

When social scientists are invited ‘late’ it is usually because of the following assumptions about what social science can do:

1. The outcomes are already decided – we just have to prove it!

- Proving the hypothesis syndrome
- No input from a social perspective on problem conception
- 2. We just need to tell people what we know and they will change how and why they do things!
 - Knowledge = behaviour change
 - Ethnocentric stance with respect to knowledge
 - Behaviour is something that changes overnight
- 3. Why do I need to let the farmer know I am sampling on his land!
 - Treating stakeholders with respect
 - Understanding the need to involve people who are not scientists in the research process
- 4. Can you do a full “social analysis” of the Sekhukhune District municipality in 40hrs?
 - Project management
 - No conception of number of hours it takes and effort involved in social research
 - Budget for social science work usually an “add-on” or cut in half
- 5. Anyone can do an interview/ I am a person therefore I understand culture/politics/religion
 - No concept of methodology and method
- 6. They want a trans-disciplinary project – we have ecologists, town planners and physicists – we are good to go!
 - Understanding the value of different knowledge types

Karen then opened up for discussion the question how do ‘research problems’ change once a social scientist gets involved.



Karen Nortje on the importance of including social scientists in research problem formulation

Tackling social aspects of IWRM, complexity, social learning (Jane Burt, for AWARD. Harry Biggs presented for Jane Burt)

For this talk I'm drawing on the work of AWARD who I have just joined and my own work in the water sector. AWARD is a research-based NGO that focuses on water and rural development in the Lowveld regions of South Africa. It looks at research in relation to practice and thus research is viewed as a process of change and transformation.

At the core of this research-based approach is an articulated position of research as a change agent. It is not a just an activity to generate new knowledge, it is a process that is responsive to questions arising out of practice. At the core of research practice at AWARD is the importance of context (and understanding this) and the importance of practice (and understanding and

transforming this).

There are 3 points that I will raise to start this discussion:

1. A shift in context and subsequent influence on practice: a shift from a discourse of plenty to a discourse of scarcity. This is reflected in South Africa with 15 - 19 water management areas being closed catchments. I use the word discourse intentionally because the world's resources were never 'infinite', it was our perception of them as 'infinite' that defined the way we used resources. It is our discourse of resources that has changed not the nature of the world's resources. In response to this change in discourse we have changed our practice from managing water as a abundant resource with an interest only in supply and demand, to managing something completely different. Sharon Pollard writes that IWRM has led to a shift in discourse around water management where the focus is not on the management for supply and demand but rather management for sustainability. The key questions in this scenario then are how to manage water in a 'time of scarcity' and possibly 'absolute scarcity'. And the key process of transformation is aligning practice with these big shifts in context. How is practice transformed? By developing responsiveness. How do we develop responsiveness? By engaging in on going learning as a key process of management. How do we support this on-going learning? By understanding context and practice. One cannot support the development of reflexive and responsive practice and practitioners if we don't understand the context and practice in which they are having to function. You can't ask someone to play cricket if they know only the rules of soccer. It is the same in this situation. AWARD draws on theoretical frameworks to assist in understanding practice of context so as to support the transformation of practice on response to changing needs.

2. At a national level this change in context and practice is reflected on the NWA with Water resource management practice being decentralised to a catchment level and into multi-stakeholder environments. It is AWARD's experience and that multi-stakeholder environments are paralysed and bedevilled by inaction. A common comment of stakeholders is 'Nothing ever happens.' Why is this the case? One reason may be that people don't understand what they have to do and, often they don't understand the implications of what they have to do? This again is linked to a careful understanding of WRM practice and designing these practices in a way that are responsive and relevant to local stakeholders. In this case AWARD draws on theoretical frameworks that help us understand a practice as socially embedded both culturally and historically and we need to work with an understanding of this context if we are to shift practice

3. Finally, AWARD has drawn on the idea of collective action as a key process for integration and decentralisation. Again in order to support collective action there is a need to understand how people practice water resource management and where the gaps and contradictions lie in their practice. Here, the focus of collective action is on integrating practices not institutions.

We draw on activity theory (which is similar to action research) to understand practice better and draw on social learning as a collective activity of 'learning together to shift practice.' This approach to learning again highlights the overarching approach of AWARD - that research and learning are not just about 'knowledge generation' or 'knowledge transfer' but that both these processes, as well as the activities that arise from them, are situated in a social context. Both research and learning can be processes that perpetuate ongoing practice or they can be forces of transformation in response to context. The aim of the current USAid funded project in the Olifants Catchment focuses on developing resilient catchments. This cannot happen if we don't look at how to develop resilient and responsive networks. To do this we need to create nurturing learning environments that are responsive to questions of practice.

A transdisciplinary project with the explicit adoption of a transdisciplinary framework. (Dr Tally Palmer, RU)

This conversation continued later in the workshop and is reported on p. 25 as a single discussion under the heading “ . Building Trans-disciplinary teams”.



Prof. Tally Palmer on the transdisciplinary project

Nurturing a community of practice around IWRM research, a history (Eiman Karar, WRC)

Eiman Karar began her discussion by defining Integrated Water Resources Management (IWRM) and community of practice. She then discussed that up until now the WRC had established disciplines in water use, waste management, water quality characterization, water resource assessments, water use, agricultural water use, water resource protection, to address their mandate of contributing towards the creation of a sound knowledge base for the implementation of the NWA and the WSA.

To engage the interdisciplinary paradigm, areas relating to equity and a rights approach to water, engaging the subsidiary principle in Water Resources and Water Services and issues of decentralization, adaptive management were initiated in research projects.

The aim was to create the magnet to attract different disciplines to engage which is fundamental in creating a Community of Practice. The need however is not only to engage but to create a joint enterprise and a shared understanding of what brings them together.



Ms Eiman Karar on developing a community of practice in IWRM

To do this the following investments made were:

1. Strengthening the individual disciplines through research funding and capacity building.
2. 'Force marrying' research teams – to break the disciplinary divides through solicited calls for:
 - Franchising of Water Services operations and maintenance
 - Gender mainstreaming
 - Impact studies e.g. effects of eutrophication on society, economy and environment
 - Effects of climate change on water quality and aquatic life
 - Ground Water/Surface Water interaction
 - IWRM indicators
3. Creating opportunities for open dialogue
 - Within and outside disciplines
 - Allowing for different levels of participation and allowing for public and community spaces
4. Acknowledging and nurturing the CoP by creating the appropriate mechanisms such as the WRC light houses which are CoP and partnership domains responsible for co-creating new knowledge, showcasing existing innovations, co-learning and building capacity.

Session 5: Distilling learnings from the day

Process: In plenary presenters fed back what had been learned from their group discussions. The facilitators then ran a World Café where participants could discuss their experience of the entire day in conversation with each other.

Session 5: Distilling learnings from the day.

Feedback on the marketplace discussions

Dynamics of Community Non-compliance - Dr Lynette Dreyer, independent

The following was discussed:

- The WRC should have a conference that confronts the different disciplines.
- Disciplinary boundaries are not always bad.
- Encourage a course on social science within engineering faculties.
- Working with disciplinary jargon. One participant framed her social interactions in engineering jargon. Other participants felt that this undermined social scientists.
- Creating connectors with the other sciences. For example, ecologists did manage to do this.

Ethics, social justice and human well-being: the Capability Approach and Integrated Water Resources Management Prof Jaqui Goldin, UWC

The following was discussed:

- Complexity when dealing with intangible goods, how you measure them, what matters.
- Possibility that as social scientists we were victimizing ourselves. We are already quite dominant in the world, we are leading research agenda.

"No to extraction!" Action research around water and sanitation issues - Dr Mary Galvin, Umphilo waManzi

There was a lot of enthusiasm for participatory and action research and support for the idea of giving back to the community, and the integrity of research. Discussions included:

- How challenges can be turned on their head to become opportunities. This requires flexibility.
- The importance of long term engagement.
- The danger of academic activists. They can get the balance wrong and perpetuate their own agenda. For example encouraging protests because of an academic idea of socialism. This may influence the way in which academics interpret a protest and influence it.

The politics of studying service delivery protests - Dr Barbara Tapela, PLAAS, UCT

We need to recognize that inter-disciplinarity has to happen by way of negotiation of meaning. Ethical vs. political stands are not mutually exclusive, ethics are moving targets. A suggestion would be to look at the constitution as our common ground, as our social contract that binds us together. We also need to consider the notion of contested spaces, because social protests are just one dimension, there are many social spaces. The need for critical discourse analysis as a way of understanding this is pressing in social science studies around water. Counter narratives are needed, such as resilience narratives.

Anthropology of wastewater, especially in informal settlements - Prof Mugsy Spiegel

Everybody around the table had their own story to tell about wastewater in informal settlements. For example one of the stories were how the Stellenbosch CSIR put up some urine diversion toilets, and nobody used them. If we are going to experiment with alternative technologies, we have to do it in the suburbs. If we could get the municipal government officials to install alternative technologies in their homes with subsidies to their homes or penalty rates for not using alternative technology this may lead to alternative technologies tested and accepted (people in informal settlements don't want to use what upmarket world does not use). Funding for free basic water should be taken away (from municipalities), and should be tied to social grants.

When social scientists are invited late in the process; The importance of including social scientists in research problem formulation Ms Karen Nortje, CSIR

Discussions included:

- Social scientists know that understanding comes before change.
- Social scientists know that knowledge does not mean behaviour change.
- The victim status of social scientists. If we had claimed the space, how would we behave, what would we take responsibility for. We must become activists for epistemological pluralism.
- Do we have an innovation obsession? Maybe we must look at what is old.

History, transdisciplinarity and emerging social water issues - Prof Johann Tempelhoff, NWU

Discussions included:

- The movement of water, and that there is music in movement.
- Discussions around the case study in Williston, and the fears that people had about floods, and the impact that it had on them to see the sea for the first time.

- The relationship between our religious practices, and how our imagination works, and how the processes of the spirit shape our reality.
- How memories of the past fired the protests of the present. History is memory.
- About heroic hydrology, and the construction of massive dams.
- Music resonates with protest. The case of how we are organizing protesters and non-protesters to share their songs.
- There is harmony in research, we must establish harmony between natural science and social sciences, there is an example of CSIR and HSRC project doing that.



Prof. Joan Tempelhoff in discussion

Tackling social aspects of IWRM, complexity, social learning - Harry Biggs for Jane Burt, for AWARD)

Discussions included:

- The long-term engagement in a project is part of the success of a project. One thoughtful person said, this whole 10 or 15 year outing for AWARD and Kruger Park, we got where we are because it has been 15 years. And the funding cycle is 5 years.
- AWARD has been working with these ideas for a very long time and that is what makes it possible.
- There was enough of an understanding of the river crisis and different stakeholders needs.
- You can't deal with complexity if you can't handle paradox.

A transdisciplinary project with the explicit adoption of a transdisciplinary framework. Prof Tally Palmer, RU

Discussions included:

- The Trans-disciplinary project is not big, it is bigger and it is important to consider what is possible.
- How a participant is properly empowered to participate meaningfully.

Nurturing a community of practice around IWRM research, a history Eiman Karar, WRC

- IWRM and community practices were broadened to include water services.
- The WRC is making progress. We are evolving to a good space.
- Victim mentality for social scientists is linked to a non-acceptance of social science methodology. Social science methodologies are not quantitative. They need to be recognised even by social scientists themselves.
- To support socially robust knowledge, even our natural scientists should acknowledge that there is a social component to everything we do. A lot of times it is a forced marriage that needs to be made.
- Who defines the agenda for science in the service of society? It is not ideal if this is done by scientists themselves.

Feedback on World Café

For more information on the technique of World Café go to www.theworldcafe.com

Question guiding discussion: “Given what you have seen, heard and felt today, what are you noticing about the current social research landscape in relation to water?”

Group feedback on the World Café conversations:

- An interdisciplinary approach is necessary. Social scientists and scientists hold pieces of a bigger puzzle. Need to harmonise role between science and social science.
- There is an increasing recognition of the contribution of social science. Social scientists need to claim their space.
- What should the future social research landscape look like? The following issues were discussed: funding, more opportunities to engage, interact and learn, use of language across disciplines.
- There was surprise at the variety of social science research activity across in water sector. We need to communicate and share more within the sector.
- Strong feeling of that a community of practice is already in place. Some felt that if you are a new entrant to the community, the barriers to entry are high as there is a lot of competition amongst social scientists in the sector with regards to disciplinary differences.
- A strong social science community makes the sector attractive to new entrants. Social scientists should be visible, publish work, share stories.
- We need to create ways of valuing different knowledges. There is a sociology and subjectivity around how knowledge is constructed in “hard science”, which is unconscious.
- There are big differences between how scientists and social scientists are trained and between how different social scientists are trained.
- Trans-disciplinary research is research with a transformative agenda.
- People present at the workshop have a strong commitment to transformation.
- We need to keep the pipeline of social scientists coming into the water sector strong.
- What is the role of NGOs in the research agenda?

Individual feedback on World Café Conversations:

- There has been a lot of reflection regarding our own positionality in the water sector.
- Participants got carried away with defending a social approach and not reflecting on what they had seen or heard about the current social landscape.
- I was struck by the role that social scientists were playing in the water sector.
- We need to make explicit the shared values as social researchers, especially related to societal transformation.
- The need to find a relative common ground/voice of the social sciences within the water sector.
- It struck me that social scientists were not exploiting the high degree of subjectivity and social processes that are really happening in the way so called “hard scientists’ construct their knowledge. This could be an entry point for cross discipline conversations.
- Get rid of disciplinary boundaries by creating communities of practice around explicit water areas.
- Social science must be pro-active and take the lead. It is important to engage in knowledge exchange and interaction with other fields.
- Appreciation of the role of different knowledge contexts in water research.
- I was struck by the enthusiasm for the social side of water.
- Commonalities in discussions on relations between roles of natural and social scientists in the water sector.
- It’s great to have an opportunity to be in a room with so many people who share my language. There are more of us than I thought.
- Acceptance or acknowledgement of the need to redefine the role and place of social science in transdisciplinary projects.
- What struck me was the tensions, diversity and the silo-ed nature of the social sciences in the water sector but also that there are so many social scientists.
- I feel we’re talking around the edges of a very interesting conversation, but aren’t quite in the conversation yet (or I’m not in it yet) it is still forming.
- Move beyond natural and social science divide to focus on commonalities regarding real life problems
- The need for social science to ‘sell’ themselves to the natural sciences.
- Will a marriage between social and natural science bring about one of the desired end results namely a move towards science in service of society, if the debate remains within academia or with researchers?
- Great enthusiasm and passion about social science and water research
- Social scientists are not at all a homogenous group. We are extremely diverse.
- I don’t like natural scientists telling me what social scientist should and should not do.
- The diversity of backgrounds.
- Working together with other disciplines is not as hard as I thought.
- How quickly participants respond to ideas and move on. For example, from victimhood to responsibility.
- I’m fascinated by the level of engagement between social scientists and natural scientists. Most importantly the willingness to work together and move forward. However we need to implement the resolutions that come out of the workshop.
- The will and zeal of social scientists to reclaim their space in the water sector.
- The passion of people here.
- Universal motivation to make a difference to the lives of people despite the uncertainties/disagreements regarding best ways to achieve. What we do as social scientists is a ‘human-centred science’.

- Assertion that natural scientists are 'behind us' in respect of addressing complexity and the threat that carries.
- The amount of agreement between the participants (common insights).
- Institutional obstacles to growth of a social research agenda and community in the water sector and other sectors.
- We drop the level of our 'game' and diminish ourselves to fit in with 'hard sciences'.
- Economists are absent from this workshop.
- Inordinate time pressure, value of learning from others, confirmation, of extent of social scientific work in the water sector. This was a surprise.
- There is a strong need to find ways of making the value of social research more visible.
- The social science stories need to be captured. How did you land in the water sector? How can you bring a social scientist to the sector?
- People suffered from fatigue and were not able to add any more to what was already said.
- The extent to which social scientists would like to be understood and accommodated while not wanting to allow the natural scientists to contribute to their work.
- What struck me most was the level of understanding of the shortcomings of social research and the importance of social research in the water sector.
- The need to use common language and terminology.
- What a difference it made to have met, and named the people at the table and explored some of their knowledge and thinking.
- Social researchers should create a platform in which they could be identified e.g. A body (association), forum, a list of social scientists and specialty.
- From victim syndrome to actively reclaiming space for social scientists.
- Social scientists are willing to work with natural scientists.
- There is a need for greater collective discussion on matters related to applied (empirical) water research.
- The passion of the social scientists in the two groups I was part of.

Day 2: Creating

Session 1: Connecting the dots to one's own practice

Process: Participants split up in pairs and dialogued on the following questions:

Connecting the dots to one's own work or practice

Feedback from group discussions

- Our reasons for coming to a workshop like this are different. I am one of the quiet voices. I'm an up and coming water professional so I want to be a sponge and absorb as much as I can.
- It is important that we do not lose sight of why we are attending this workshop. We have come to identify ourselves as social scientists in the water research and then develop new research ideas, new research agendas and networks. In the Eastern Cape we are developing an inter-institutional water research institute with Fort Hare, NMMU and RU. This workshop offers us a unique opportunity to get to know who is in the sector particularly for co-supervision of students. We want to attract students that are internationally competitive.
- We need to develop this further so we can build partnerships, put together joint proposals. There are some really great social science researchers in the water sector in in a meeting like this we get a sense of who they are.
- There are big differences between social scientists and differences in expertise. It would be good to educate each other in different methodologies. We could work towards internal training programmes, for example getting to know how we could use water law in our work.
- It may assist social scientists in dialogue with scientists and to overcome sense of inferiority that social scientists get some training in natural science.
- A lot of WRC technical reports are inaccessible to social scientists. A suggestion is to produce an easy to read book of summaries which would be more accessible.
- We need to debate what makes social science a science, if it is a science. What makes social science rigorous?
- The social sciences and humanities are concerned with methodologies and methods whereas scientists are not. The reason for this is that we are part of what we are studying. We can't divorce ourselves from what we are researching. Natural scientists can't either but they act as if they can and do not realise the consequences of doing this. As scientists begin to question their paradigm they may find themselves foundering whereas some of the social science disciplines have been reflexive about the practice of research for decades.
- We need to consider the barriers and boundaries we set up in our work, such as the barrier of the language that we use. We need to be careful that we are not setting up another boundary by referring to 'the water sector'.
- A way forward is to have a community of practice and to project where we would like to be in 10 -15 years. It is good to be reflexive but we also need to have an idea of where we want to be. South Africa is the ideal melting pot for innovative research and the potential for making a contribution to the world.
- I used to be a researcher now I'm working for the NRF. I have to constantly remind myself that I am making a difference in a different space by making funds available. Being in the room and listening I feel a bit perplexed that social researchers feel disempowered in their professional position. A social researcher role cannot be separated from any other role in life and we may be forgetting our role as social activists as social researchers. At the same

time I find it disturbing being in a room with only social researchers. Trans-disciplinary research is better because we start acknowledging that problems can't be solved by just one discipline.

- It would be good to know who is doing what by putting together a data base that slots people into different areas of interest and expertise.
- NRF is interested in supporting Trans-disciplinary research and have a short funding programme for short term engagements. It allows space for researchers to find one another in a new or emerging field. The NRF funds meetings whose aim is to come up with something substantial that will feed into a proposal.



Open Space (task teams) sessions

Process: Based on the discussions of day one, participants choose to host discussions based on their interest and/or questions?

Feedback from task-teams

Building Trans-disciplinary teams – Tally Palmer

Why is this relevant to social science in water?

- TD offers a respectful way of including the widest range of knowledge in the search for loosening and living with some of the most difficult challenges of life of the planet (wicked problems)

What has become clearer?

- That this is possible. It has previously seemed too grandiose, too complex, too broad, too diffuse, too shallow, too time consuming, too difficult.
- That there are enabling instruments to practice and develop TD practice and scholarship (existing projects and funding opportunities.)
 - Existing platforms: the RESILIM project (USAID – funded, in 18-months time NGOs will be able to apply for funds to practice in the Olifants). The project is explicitly based on TD research and practice.
 - The WRC towards a new paradigm (TNP) - there are funds to link to and learn from other existing scholarship and learning. The project is explicitly based on TD research and practice.
 - The WRC water flagship is also a project explicitly based on TD research and practice.
 - The NRF has a development grant (R200K) to initiate a scholarship area – TD could fit with this.
 - The NRF may host a call at the end of this year from the Belmont Forum which is an opportunity, but this would have to be under the theme “Sustainability and Society”.
- The concept of social-ecological systems offers one space and perspective that lends itself to TD approaches and is particularly relevant to water as we look at people, living in a landscape – a catchment – and water is an integrated aspect of this social-ecological landscape. (Where social encompasses all of social science and humanities) and ecological encompasses all of the bio-physical sciences).

What is the purpose?

- The process of building TD teams required both practice and scholarship. If we want to use knowledge to address issues we need to have ways of harnessing knowledge in many places: in the context, in civil society, among people with different and deep understandings.
- Building a TD team requires an understanding of the TD concept and of ways of pooling and selecting from a wide array of possible methods each of which finds its strength, or reliability, or gravitas from a theoretical place. Theory and methods and methodologies are multiple and may overlap, and most have different languages – The purpose of building a TD team is to both retain the best of each knowledge source, to be able to link these to underlying theories so they can be interrogated and critically evaluated, add to real knowledge and to context – drawing of local knowledge.
- It seems that engaging co-operatively to work on challenging issues (like water) provides an opportunity to work together in this demanding way and to build what it means to engage in TD research and practice at a deepening level – towards “excellence”

What resources are needed?

- The building process takes time – we have to share the knowledge the sharing the different ways of thinking - and time need money!! Developing TD research and practice is an INVESTMENT
- An early resource can be an iteratively developed “guide” to TD research and practice in the water landscape in SA
- Funding takes account that this is in a development phase and funds are needs both to “do the project” and “to reflect on and learn about how to do the project”
- Glue/communication/exchange funding to link existing funded projects to share learning.
- Recognition that some participants have to operate on “charge out rates” – e.g CSIR, small business like the narrative lab that used their practice to research, NGOs, self-funded academics – usually in research institutes – this is critical.

What else is needed?

- Willingness, enthusiasm,
- Creating spaces for all voices to emerge
- Encourage the practice of reflection and learning among all disciplines

What are the next steps?

- NRF may consider proposals for transdisciplinary engagements
- Tally will invite participation in the TNP project
- Harry will connect into the RESILIM opportunities

Development of the criteria and ways of evaluating TD research practice.

Comment and discussion:

NRF reminded participants of the four funding streams that support Trans-disciplinary research and there is a lot of opportunity for collaboration. What the NRF has found is that not many social scientists take advantage of these calls.

Action research in the water sector – Jessica Wilson

The group identified a mismatch between the requirements of action research and the way in which research is funded by the WRC and other funders. The group suggested that we need to help the WRC reframe how it sees research, what it sees as knowledge and, how it evaluates social research projects and action research in particular. One way of funding research differently would be for the WRC to develop partnerships with other funders to fund projects that are not only research projects but social change projects. Other suggestions were:

- Write an article for the water wheel about what is knowledge
- Have an open conversation with the WRC on action research and social research and how to evaluate them
- Develop a workshop for key decision makers in the WRC around action research to build a common understanding
- Develop a short course on social research and what it involves
- Develop a proposal to the WRC around these issues

Comments from plenary:

- Some of these suggestions could feed into the WRC road map
- Action research is intrinsic to Trans-disciplinary projects.

Crucibles between science and social -science - Mark Dent

The crucible exists for conversation between science and social science and my contention is they are called CMA's. The resources that team can bring to this process are: leadership expertise in this area, expertise on integrated bargaining, expertise on modeling.

What don't we know?

- What we don't know is why stakeholders are not engaging in the CMA space particularly as no other space has the mandate or power of a CMA to engage stakeholders.

What do we need to do?

- The WRC needs to engage leaders of the main stakeholder sectors.



Dr Mark Dent in discussion

Safari conference – Marika van der Walt

The concept of the conference is the role of water in the Southern African society and to investigate the development of greater societies of water in Africa. It is an exploratory conference therefore the more that participate the more will be learnt about society and water in South Africa.

Water Equity Forum – Eiman Karar

The focus of the Water Equity Forum is the sharing of water the benefits of water equally. The ongoing debate is between subsistence and water for the economy.

- Focus areas include access, infrastructure, authorities
- Do we need to relook at the NWA and Bill of rights?
- What issues will be discussed?
- Water equity not only relates to water services, it also relates to water resource management which may mean looking at previous allocations, involving different departments in the process, focusing on the problems of emerging farmers who have access to land but no water.

Comments from Plenary:

- Isn't the water equity topic already on WRC agenda?
- Response was that the request for the Water Equity forum came out of a government meeting with stakeholders and the recommendation is that it should be taken forward.

Creative arts and water – Colin Skelton

The group explored how the artistic process can also be a form of narrative and dialogue.

- The arts can be used to support existing and conventional dialogues and conversations.
- It can enable an expanded experience of how humans can react
- The inferiority complex of social scientists that some participants articulated is also present in arts practitioners

- Arts methodologies are a very under-utilised methodology.

How to get critical thinking and analytical eclecticism going? – Richard Meissner

We need to preserving all the positive things that have happened e.g. action research, adaptive management, complexity, resilience, trans-disciplinarity, benefit sharing, in other words all the fads that are floating around but engage them critically and nurture their contribution. There is an absence of critical dialogue on certain theories. Theories become popular because they are not debated and gets colonised and there is a lot of this going on, adaptive management is an appropriate example. In other words, there is a popularisation of all these theories and methodologies and we need to have a serious debate and create a platform for critical dialogue.

This process should become a role modelling of critical discussion with a focus on developing strong social theory to better understand the water sector. Questions to consider are:

- What is strong social theory?
- What is out there?
- What is the genesis of theories?

One of the discussions were around complexity theory/thinking and how it is limited in explaining agency, norms and cause and effect feedback and feed-forward links. Dialectical importance needs to be included. This could become a pre-condition for cooperation between social and soft sciences. What will be the processes? Validity for theory needs to be created. What is the current theoretical thinking? The water sector, and here I am quoting Lake (2011), is characterised by three evil 'isms': positivism, neo-realism/neo-liberal institutionalism (adaptive management is part of the neo-liberalism agenda and transdisciplinarity).

Practical ways to implement the idea: Start a theory forum in the water sector, make theory more palatable to everyone, conferences, papers, case studies and let the theory come out of it. Imagine a conference where there is careful selection of essays in Water SA as a serious shift in the water sector. Two topics: Criticality and analytical eclecticism. We need to theorise criticality and engage in critical dialogue.

Further questions are: To what extent is there an understanding of the assumptions of the different theories that we use? In other words, do we all understand all the assumptions the same way?

Contested spaces – Barbara Tapela

The discussion was orientated towards exploring possible research looking at contested spaces in terms of methodology, issues, research and practice, administration and funding.

Discussed contestation in water spaces as well as contestation within trans-disciplinary teams. Suggested that to deal with this contestation there needs to be self-reflection within the research team. There was a debate about the sequence of dealing with contestation, whether the team should work with contestations first or whether this should happen in parallel with working in an area leading to generative action and generative dialogue. Power issues need to be made explicit.

Research on contested spaces falls into the category of 'wicked problems'. Do WRC funding systems support trans-disciplinary questions that cut across key strategies or should the WRC re-think its existing structures and align them with the research terrain?

The suggested next step is a conference driven by the WRC.

Comment from plenary:

There is a journal of trans-disciplinarity in South Africa which could be used as a platform for these discussions.

How do social scientists become research project managers?

The group discussed how there are spaces for social scientists in the current structure of the WRC. One needs only to look at reports and identify gaps to research.

Summary, closure and way forward

Road map for WRC and plenary

Suggested way forward:

1. Current workshop is a starting point for developing a community of practice. The aim is to bring people together, discuss experiences and realize the diversity of social science in the water sector.
2. Workshop report: The current project team will write up and disseminate workshop report.
3. A contact list will be distributed by Inga. The contact list currently includes a brief biography of participants. People can add and correct the current document before it is sent out to all participants.
4. A database or research directory will be developed linked to the updated WRC website. One mechanism could be to develop an interactive space on website.
5. There will be a review of existing research conducted by the WRC.
6. Development of social science forum. This may not only be WRC driven but rather a platform for social scientists with the WRC providing support and participating.
7. Social research conference as one way to catalyse people into co-partnerships or starting joint research projects. The conference should be run according to thematic areas which work towards building some form of organisational structure for the CoP.

Comments and suggestions from the workshop

Forming a social science community/conference:

- A conference is not enough, there needs to be more regular interaction.
- I like the stepping stones approach but there is an in between stepping stone. People need to get together locally and we need to take responsibility for organising ourselves.
- We need another workshop like this. There are many people we have missed especially applied researchers.
- The second workshop needs to be the start of a proper platform. We need to meet locally and then nationally. Supporting regionally strong groups is very important.
- There are many conferences where we can engage in social science discussions.
- We can start a blog or facebook page to communicate but we need champions to drive this.
- Blogs are important but it cannot replace the importance of face-to-face dialogues.
- I am not convinced we should have a conference for social scientists in the water sector. There are already forums and platforms should we not strengthen these and drive our

agendas there? The Savanna science conference is one of these potential platforms.

- It is important to do both. It is necessary for us to take the social science agenda into spaces that already exist but we also need to interrogate it amongst ourselves.
- A note for developing the database. Don't go into specifics first as then we are talking about the WRC defining its own social science agenda. Allow social scientists to define the specific categories. Holding a conference will help with this as you will get different thrusts. These different thrusts could work towards papers that will help the WRC decide what the social science agenda is and a way of categorising it.
- Crafting a social science agenda for South Africa is a process. We also need to consider whether the people involved in defining this are only social researchers or also actors in the state and private sectors. The social science we are talking about should talk to national and international frameworks that influence our policies. We also need to consult communities through civil society organisations. As we conceptualise the mind map we also have to reality check whether what we are proposing is sufficient to take us forward, whether it will have buy in and beneficial to our society
- There are two forums that we can immediately get involved in. The WRC annual conference. The next one is in September. The conference tends to be highly technical and a masculine environment. I would like to see this changing. But I also need a space where I can feel safe to explore particular difficult questions without always feeling judged and having to argue for the importance of what I am doing with technicians.
- One suggestion is to have a conference that fulfils the purpose of both a trans-disciplinary space and social science space. It can have a few days for social scientists and then open up to more trans-disciplinary studies.
- One suggested model for regular conference/interaction is the Environmental Education International Seminar which has regular meetings around questions of theory and practice. People present cases which highlight questions and catalyse discussion. Questions are discussed amongst the group with the intention of changing research practice and how research can change practice on the ground.

Issues of funding

- Do we have a dedicated call for social science research and what would this look like? Before we do this we need input from the actors involved. Before we do this we need to develop trust. This is also a competitive space as people are looking for money to do their research and fund their students.
- A suggestion is not to make a dedicated agenda but rather a dedicated fund for social science.
- Also to look into co-funding and structures of funding. Unpack the possibility of funding partners.
- Should look into how to make finding funding easier so you don't spend 50% of your time finding funding and 50% of your time doing the work. For example, easy application processes and presentations by funders so we know what funders want from proposals.
- I suggest that we don't have a fund for social science but a fund for a social transformation agenda with research embedded in this process. This means looking for partnership funding for social change projects.
- Under the smart fund at the WRC you can put in an action research project. Some mechanisms do exist but WRC still needs a mechanism for receiving and evaluating proposals in a conducive way.

What are the loose strands that still need to be weaved into this conversation?

- A research area that has not been mentioned is how the CMA can be used as leverage for social change.
- Polycentric governance that is necessary to run water research.
- Building trans-disciplinary research, action research and contested spaces.
- Need to develop and support strong social theory and theory reviews. We are not just looking at theory but the effects of theory on processes and changes.
- One of the issues we were raising in the action research group is not only does there need to be social science research at the WRC, but also a review of their framework that is actually making social science worse. The changes we are asked to make in our project proposals make our studies worse because managers do not understand what we are trying to do. We need some kind of toolkit to help the WRC reshape their assessment process and support them in working with social science studies.
- Does the WRC need to review how they fund social science or do they need to review entire funding model?
- One can't break up wicked problems into tame problems so fitting them into KSA's and a funding stream is exactly that trap.

Action: Set up a task team to look at how to fund social change projects (that draw on action research methodologies) and trans-disciplinary studies that develop around wicked problems. Volunteers to help with this are:

- Jessica Wilson
- Mark Dent
- Jacqui Goldin
- Mary Galvin.

What are you taking with you from this workshop?

- I feel like a very saturated sponge. It was great to learn about funding opportunities and chat to people. I'm excited to share what I have learnt with others.
- There is a wealth of knowledge in this room. We seem to be grappling with common problem. We have constructed boundaries for ourselves and we have to transcend them.
- I am reminded how great it is to be a social scientist.
- Joyful experience and a steep learning curve.
- It was a steep learning curve. I got to know the water sector better. There is fantastic social science happening.
- Very surprised at variety of social science happening in the water sector. I thought I knew what was going on but I underestimated this.
- A cohesive sense of identity. There is cohesion between Social Scientists finding a common way of engaging with world.
- It was a fantastic opportunity. We don't have to defend ourselves as we do in other settings.
- Met many people and will have something to do with them in future.
- Refreshing to see Social Scientists appreciate that they do science and for me knowing and seeing the value of what they are doing. Nice to hear someone speaking about action research and the role of it.
- I enjoyed the facilitation techniques and it was great to connect with old colleagues and attach faces to names.
- Good feeling excitement about a new community beginning to emerge and contributing to

it.

- Feel like we are making a home for our research. I hope we won't lose momentum. A lot of good has come out of this workshop and an awareness that we often emphasize our differences but we are more similar than we think.
- Interesting welcome into the WRC.
- Grateful and inspired to get insight into facets of social science in water research.
- The breadth of knowledge and information here has been great. I have a better sense of where our work fits into the research framework and people to talk to when we are struggling around methods.
- I feel happy and relaxed. I am grateful to everyone who made it possible. I love this space and seeing so many social researchers in water and hearing the discussions and the concerns are wonderful. I love the theory part and I like the activist part.
- I'm leaving with a bag full of contacts and business cards and a better understanding of water sector and social science.
- I have been working on a civil society programme for 3 years so despite the fact that I am in action space I've been starved by working with engineers but here I feel replenished. The supporting system is the epitome of that.
- Gratitude for a list of names because I think that is the beginning of a community. I discovered how much social science is going on in the field and there is a whole lot more that can be done so there is space for many more of us... and the theoretical discussions intrigued me.
- I have a sense of renewed energy, hopeful expectation and kinship and enjoyed how people gave so spontaneously and freely.
- Loved listening to diversity of social science community.
- Yesterday we had debriefing and I felt overwhelmed by expectations of the WRC and on me and that I'm crazy enough to drive this social science agenda. Today I felt a sense that it is not only on my shoulders and there is a support system in place. Thank you all for participating non-judgmentally. Bear with WRC. There is a lot of noise that we will have to work through to get to where we want to be. This is a great start and a useful one and keep the momentum going. I thank you for contributing to road map.

Final thank you and closure

Dr Inga Jacobs expressed gratitude to the group. She said that she understands why the workshop was structured in the way it was. To launch into something like a social science agenda would have been a bit premature. The design is a process design with the research team initiating it and then bringing in facilitators for this meeting. She expressed a hope that participants could see that this is part of a process. She also could feel the sense of partnership and collegiality. The last session gave her confirmation and confidence in the process and a way forward to work towards together.

Appendix 6: Participants' interests in social research.

This list gives information to assist participants in connecting with each other.

Prof Wilson Akpan, Deputy Dean for Research and Internationalization in the Faculty of Social Sciences and Humanities, University of Fort Hare. He is an environmental and development sociologist, with an abiding interest in the social and ecological dimensions of small, medium and large scale development programmes and projects (e.g. dams, oilfield and mineral development), as well as the policies and social/institutional arrangements that underpin them.

Dr Harry Biggs, SANParks, is part of the Communities of Practice Group at SAPECS forum. He is interested in social learning and transdisciplinary research, esp. in the USAID RESILIM project.

Jane Burt, independent researcher working for Rhodes University and AWARD. Environmental Learning, Transdisciplinary Research and Practice, knowledge representation, sociology of water management practices, social science research methodology.

Aidan Choles, Narrative Lab. Aiden co-founded The Narrative Lab an organisation development and research consultancy. With a background in psychology, Aiden trained as a narrative therapist. For the last 10 years Aiden has been exploring methods and approaches that incorporate narrative as a means of deepening understanding of complexity and improves problem solving in organisations and communities. Having run a few WRC social science projects Aiden is further developing the TNL methodology, known as participative narrative enquiry (PNE).

Hameda Deedat, Civil society activist and researcher.

Dr Mark Dent, University of KwaZulu-Natal. Social processes in scientific research knowledge generation; wicked problems; integration as a social phenomenon, water re-allocation as a socio-scientific process

Busi Dlamini, Reos Partners, has a background in community media, using dialogue as a methodology for HIV Aids communications. She has been a process facilitator for the past 8 years, with Reos since 2008. Cross sector collaboration in health, human rights and mining, focusing on mining safety. Teaches at the Gordon Institute of Business Science at Pretoria University.

Dina Downsborough, Monash University, South Africa. Social learning, communities of practice, interdisciplinary research programmes, Capacity building, development and participation

Dr Lynette Dreyer, sociologist and researcher with experience in the water and other sectors. She wrote the path breaking "Dynamics of Community Non-Compliance" for the WRS. She is currently involved in research on rivers.

Dr Petro Esterhuysen, University of the Free State. Women involved in food production, food security, indigenous perceptions of water, beliefs regarding the qualities of water, the use and conservation of water.

Karen Goldberg, Reos Partners has worked across academic, government, business and NGO sectors in the broad field of socio-ecological sustainability, as researcher, writer, project coordinator and

facilitator since 1999. Her particular content-expertise lies in water, sanitation and climate change. Karen has an interest in water research and the water research sector in South Africa, skills in academic research in both the natural and social sciences, a broad understanding of the importance of surfacing the theoretical perspectives and positions (i.e. ontology and epistemology) that underpin any research, and experience in process design and facilitation.

Eiman Karar, WRC, has *app.* 20 years' experience in natural resources management mainly water. She has an MSc in Environmental Sciences and a project management Diploma. She is currently registered for an LLM at the University of KwaZulu-Natal. She worked as the Director in the Department of Water Affairs of South Africa responsible for developing policies pertaining to all decentralised Water Management Institutions and their related governance arrangements. She was a Commissioner on the Limpopo Commission (LIMCOM). She also authored numerous chapters and papers mainly dealing with water governance and the management of public property resources at very local community level to regional and international levels. She is a registered professional natural scientist with the South African Association of Natural Scientists and is a member of the Water Institute of South Africa and Chair of the WISA Law subcommittee of the Management Division. Since 2005 she is involved in research and knowledge generation, dissemination and capacity building in the South African water sector at large as a member of the Executive in the Water Research Commission. As part of the WRC, she is actively involved with the International and African academies of Sciences and is the advisor to the South African Academy of Science Water Programme. Is a Technical Advisory Group (TAG) Member of the Southern African Regional branch of the Global Water Partnership (GWP). Is an advisory board member on Monash University, South Africa, Water Node.

Dr Mary Galvin, director at the NGO, Umphilo waManzi, has worked as development practitioner, researcher and activist. She is an organiser for the Blue Planet Project of the Council of Canadians, Senior Research Associate of UJ's Department of Anthropology and Development. Her research interests include community based climate change adaptation, new approaches to sanitation, assessing barriers to implementing the right to water, the impact of dirty energy on water resources, scope for civil society to act as change agents in the sector (and the role of social movements), developing accountability and resource mechanisms for citizens, the use of participatory and action research.

Prof Jacqueline Goldin. Interested in water, poverty and society, but particularly interested in bridging the divide between the technicians and the social scientists.

Natasha Govender, Narrative Lab. Involved in WRC social science research projects, interested in expanding knowledge around this topic.

Dr Inga Jacobs is the Executive Manager: Business Development, Marketing and Communications at the South African Water Research Commission (WRC) in Pretoria, South Africa, and is a political scientist specialising in international water governance.

Lesego Loate works as Researcher – Policy Engagement at the Institute for Poverty, Land and Agrarian Studies (PLAAS). His Research Areas are: Water for Growth and Development, Rural water availability for emergent productive water users, Active citizenship and access to rural water,

Effective monitoring and evaluation in (social) water projects and Social protests and water service delivery.

Prof Heila Lotz-Sisitka, holds the Murray & Roberts Chair of Environmental Education and Sustainability at Rhodes University. She has contributed actively to the inclusion of environmental and human rights concerns in South Africa's National Curriculum Statement and to the SADC Regional Environmental Education Programme. She serves on UNESCO's International Reference Group for the UN Decade of Education for Sustainable Development and is the editor of the Southern African Journal of Environmental Education. She coordinates the MEd programme in Environmental Education at Rhodes University and also supervises a number of PhD studies in the same field.

Dr Kaluke Mawila is a Director in the Knowledge Fields Development Directorate (KFD) of the Research Support, Innovation and Advancement (RISA) of the National Research Foundation. The goals of the Knowledge Fields Development Directorate are: to facilitate the advancement and push the frontiers of existing knowledge; facilitate the creation of new knowledge; promote active interaction between researchers within and across disciplines and knowledge fields; strengthen the scientific and professional organisations in the South African research community; investigate, map and analyse research interests and trends within and across disciplines and knowledge fields; refine or redefine research calls in light of the above developments and interventions.

Bonani Madikizela, WRC. I am expanding from pure Aquatic Science to more encompassing science by understanding some social science principles and work environment. I manage society based projects, which requires an understanding of social issues.

Dr Timothy Makofane, Tshwane Municipality

Dr Richard Meissner, CSIR. Interested in politics, governance, policy making, the role of theory in decision making, non-state entities.

Virginia Molose, Mvula Trust. Menstrual Health Management particularly for rural institutions provided with sanitation facilities; benefits of local water resources management at a catchment level, are these recognised, do they add value or they become too sophisticated for local grasp once they leave the localities?

Mamaponesa Morabe. Department of Water Affairs. Natural scientist (Genetics) by profession with social science experience in the form of a Masters degree in Public Health from Medunsa, covering environmental and occupational Health. She has 5 years analytical experience as a DNA Forensic Analyst, and unraveling clustered crimes using biological forensic methods at the Forensic Science Laboratory (SAPS). She worked with the Water Management Institutions for past 2 years, establishment of CMAs and WUAs, and transformation of Irrigation Boards. Currently a strategic support to the Office of the Acting DDG, Branch: Policy & Regulation (Water Resource Management Functional Area). Interested in pursuing Exploratory Qualitative research balanced with Quantitative research, in the form of a social science PhD.

Sysman Motloug, Mvula Trust. Interest in social justice issues in water resource governance – water service supply inconsistencies, catchment management and pollution, Health and Hygiene and

water conservation, Water governance theories and practical manifestation as well as explain water governance approaches such as IWRM.

Nonhlanhla Mthiyane, UKZN. Women's access to water and how this impacts on their participation in education, the economy, politics, and generally how water access impacts on their quality of life. I am also interested in how women can be supported and empowered so that their participation in decisions about water and water management can be enhanced to improve their quality of life.

Dr Victor Munnik, Independent Research and Research Associate, Wits. Human geographer. Interested in political ecology, sociology of science and technology, critical realism, qualitative research and case study methodology. Researches politics of water pollution, civil society in the South African water sector, environmental activism, coal and climate change.

Prof Agnes Musyoki, School of Environmental Sciences, Department of Geography and Geo-Information Sciences, University of Venda. Interested in examining the emerging green economy in South Africa and establishing the extent to which it is addressing social development dimensions particularly for poor rural communities. In the water sector that would be activities that promote water conservation and alternative household rainwater harvesting among others to supplement existing resources, meet household water needs and ensure sustainable rural communities. As climate change threatens whole communities, water resources are becoming increasingly scarce for rural communities – their responses and household strategies will have an impact on their livelihoods and levels of well-being requiring entrenchment of practices and strategies that are sustainable in the long run.

Dr Bongani Ncube, Community Water Supply and Sanitation Unit, CPUT. I am currently involved in various projects that have a large social research component. I am running a project on indigenous knowledge systems of coping with drought. I am also assessing the role of emerging farmers in water resource management. The research unit is involved in various social and economic issues in water and sanitation research.

Mr. Dhesigen Naidoo is the CEO of the Water Research Commission. The WRC is South Africa's only dedicated water research steering and funding institution. Previous to this, Mr. Naidoo served as Director: Research and Innovation at the University of Pretoria. He also served as an official in the South African government between 1996 and 2007. In this period he worked for inter alia, the Ministries of Water Affairs & Forestry, Environmental Affairs & Tourism, and Science & Technology as Deputy Director-General for International Cooperation and Resources. Between 1990 and 1996, he was a medical natural scientist at the University of Cape Town and Red Cross Children's Hospital.

Shanna Nienaber, DST. I am a political scientist who has been working as a researcher in the water sector. Focus on transboundary water governance and the science-policy interface. I now work for DST, managing the environmental service portfolio.

Karin Nortje, CSIR, Social anthropologist working specifically on water related issues at the CSIR. Currently transdisciplinary research in water resource management. Environmental anthropology using social science in the natural resource planning arena.

Prof Tally Palmer, Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University. Ecotoxicology, Research Management, Integrated Water Resource (catchment) Management – IWRM and transdisciplinarity Water Law and Policy.

Thabo Radebe, Dept of Science and Technology. Policy related social research.

Kombi Sausi, currently studying toward a PhD in the department of Anthropology at UKZN. My research topic is household dynamics in water deficient villages in Amathole District Municipality. Assistant researcher to Dr David Hemson on the Accelerated Water Service Delivery project in the Eastern Cape. Research interest in water service delivery with a focus on rural water management.

Geraldine Schoeman, Schoeman & Associates. Social Science Research & Development Consultant.

David Sebe, Narrative Lab. Involved in WRC social science research projects, interested in expanding knowledge around this topic.

Prof Andrew Spiegel, University of Cape Town. I am a social anthropologist who has been drawn into urban (especially informal settlement) water and sanitation concerns over the past five or so years.

Maura Talbot. Co-Director of Living Lands NPO, Patensie, Eastern Cape. PhD Student, School of Development and Public Leadership, Stellenbosch University. Conducting applied research on the potential to create payment for ecosystem services (PES) schemes that could significantly expand private sector investment in environmental restoration. More specifically I am investigating the potential to get the Nelson Mandela Bay (Port Elizabeth) Metro to invest in environmental restoration in its upper catchment areas in order to access additional water. It has become clear through conducting this research that any such scheme could only be developed if it was embedded and supported by the implementation of the water reforms envisaged in the 1998 National Water Act and other related legislation. So the project is also considering the opportunities and constraints, and ways in which this integration could be achieved. The research will feed into a broader stakeholder engagement and mobilisation process being facilitated by Living Lands around catchment, water and land management issues within the Baviaanskloof, Kouga and Kromme catchments which together supply 70% of PE's current water supplies.

Adriaan Taljaard, WRC.

Dr Barbara Nompumelelo Tapela. Institute for Poverty, Land and Agrarian Studies (PLAAS), UWC. Interested in water access rights, gender, livelihoods and food security in informal economies; Water services and sanitation; Water governance and management institutions; Water and land “grabs”.

Barbara Schreiner, Pegasys. Priorities are how to reallocate water effectively; understanding the socio-economic value of water; water and rural development; climate change and water; water quality issues; ecosystem protection.

Colin Skelton, Reos Partners. Interested in water scarcity. I am interested in the intersection between people's cultures, behaviours and the general political landscapes within which they act. As performance practitioner and researcher I have studied human behaviour and interactions through the lens of artistic activity.

Prof Johann Tempelhoff, is Professor of History at North-West University's Vaal Campus in Vanderbijlpark, Gauteng. He specializes in transdisciplinary research methodologies and uses historical thinking in his research. The Research Niche for the Cultural Dynamics of Water (CuDyWat) that he leads at North-West University concentrates on contemporary problems experienced in South Africa's hydrosphere. The team extensively makes use of the past to inform contemporary actors in the water sector to approach the future. Professor Tempelhoff is currently at the helm of the South African Water History Archival Repository (SAWHAR) – a multi-stakeholder initiative aimed at promoting the storage and management of valuable historical resources dealing with South Africa's water heritage. He is also the author of about 50 peer-reviewed articles and 11 books, which includes a history of the Gauteng-based water utility Rand Water.

Thandeka Tshabalala, DST. Interested in the contribution of Science and Technology to furthering social development.

Dr Marika van der Walt, Southern African Institute for Water and Society. We are organizing a conference with the theme: The role of water in Southern African societies: from pre-colonial Mapungubwe and Great Zimbabwe to the post-colonial Southern African Development Community (SADC).

Dr Carina van Rooyen, University of Johannesburg. Social construction of water scarcity (political ecology), water governance, local understandings of climate change and water (about the nature of evidence), transdisciplinary research.

Adri Venter, EON Consulting. Interested in the link between education, training awareness and matters of water conservation behaviours: Training and awareness programmes in the water sector are often not based on community realities and fail to establish the status quo with reference to knowledge, attitude and practices. Matters around governance: Regulation and enforcement as well as self-regulation.

Dr Wessel Visser, University of Stellenbosch, Department of History. My research speciality is the historical development of irrigation systems and water procurement for the agricultural sector in the Western Cape. At the moment I am researching the development of irrigation systems in the Breede and Olifants river valleys and at Calitzdorp.

Jessica Wilson, Environmental Monitoring Group. Interested in conducting research in a way that helps address water insecurity and water injustice at local (human-scale) level. Addressing climate change adaptation in water sector; water governance (esp. local level); protection of water resources and ecosystems.